

TABLE OF CONTENTS

Trouble-shooting instructions : MB-5027

BOSCH system : KE 3.1 - Jetronic

Make of vehicle : MERCEDES-BENZ

Basic microcard : PKW-014

Test instructions Coordinates

| | |
|---|---------|
| Special features..... | 02 |
| Self-diagnosis / Rapid diagnosis chart..... | 09 - 20 |
| Test specifications..... | 03 - 08 |
| Electrical terminal diagram..... | 21 - 24 |
| Electrical wiring diagram..... | |
| Hydraulic-lines diagram..... | |
| Diagram of air/fuel lines..... | 25 |
| Tools and test equipment..... | |
| Testing and adjustment instructions..... | |
| Installation position of components..... | 26 - 28 |
| Notes on removal and installation..... | |
| General important information..... | |

Note:

Items without coordinate details are not applicable in these trouble-shooting instructions.

SPECIAL FEATURES

* This microcard contains the trouble-shooting instructions, valid at the time of publication, for the following Mercedes-Benz model:

260 E2,6l/6Zyl.-MotorUS/J/AUS 08.86->

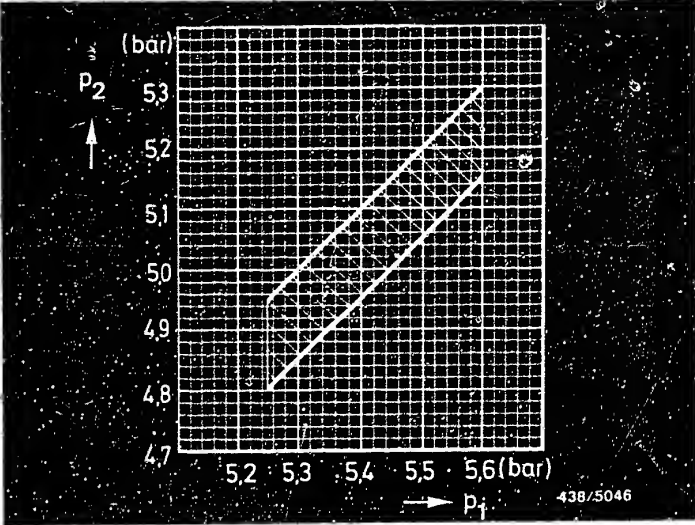
- * Trouble-shooting with these instructions may only then take place when the details of the "Summary - Service Information for Vehicles" (KFZ-000) coincide with those of the vehicle type and with the BOSCH number of the KE-Jetronic control unit installed.
- * Control unit using digital techniques, characteristic-map control using microprocessor.
- * Electronically controlled low-idle-speed control with single-winding rotary actuator, without bypass adjusting screw.
- * Activated-carbon filter and regeneration valve for return of gasoline vapors into the intake manifold. (Fuel evaporation system)

Important note:

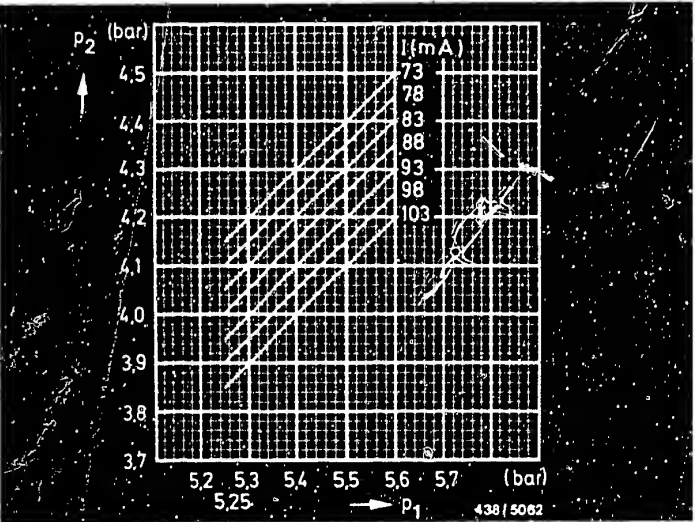
If reference is made to a basic microcard, always make sure you use the test specifications from the vehicle-specific brief instructions.

TEST SPECIFICATIONS

| No. | Testing/Test condition | Test specification | |
|-----|--|--|--|
| 1 | Electric fuel pump – fuel delivery: | At least 1300 cm ³ /min | |
| 2 | Primary pressure: | 5,25...5,6 bar | |
| 3 | Differential pressure: Suppression of peak coil current: Actuate starting motor with fuel-pump relay disconnected. <u>Do not</u> switch off ignition after starting. Take lower-chamber pressure set value "warm" from top chart corresponding to primary pressure measured. (Actuator current 0 mA) Take lower-chamber pressure set value "cold" from bottom chart corresponding to primary pressure measured and actuator current. Tolerance ± 0.15 bar. Simulation of "cold" state: press push-button 3 at test adapter. | | |
| 4 | Leakage test, complete system: Minimum pressure after 10 mins: Minimum pressure after 20 mins: | 2,7 bar 2,6 bar | |
| 5 | Injection valves, opening pressure: | 3,0...4,1 bar | |
| 6 | Fuel deliveries, comparative measurement: (Actuator current 0 mA) Idle: Part load: Full load: Min. delivery at max. air-flow sensor plate defl.: | Setting point: (cm ³ /min) 6,0 40,0 100,0 | Max. permis. delivery: (cm ³ /min) 6,6 42,5 109,0 140 cm ³ /min |



p 1 = Primary pressure
p 2 = Lower-chamber pressure

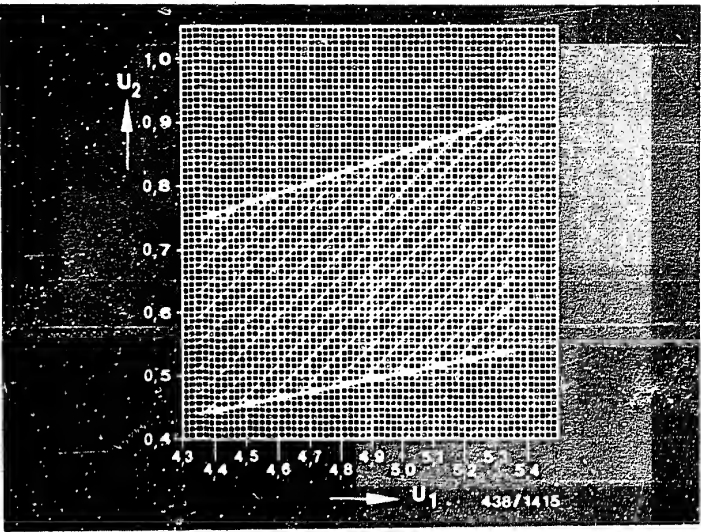


TEST SPECIFICATIONS (CONTINUED)

| No. | Testing/Test condition | Test specification |
|-----|--|--|
| 7 | Rate of flow, KE restriction: | 130...150 cm ³ /min |
| 8 | Temperature sensor, air (NTC I): Air temperature +15...+30°C: | — k Ω |
| 9 | Temperature sensor, engine (NTC II): Engine cold (+15...+30°C): Engine warm (approx. +80°C): | 1,3...3,6 k Ω 250...390 Ω |
| 10 | Idle-mixture-adjusting screw basic setting. Fuel-distributor seat - needle bearing: | 20,9...21,6 mm |
| 11 | <p>Idle adjustment:</p> <p>Low-idle-speed control: adjustment of idle-air quantity not possible. For testing, engine at norm. op. temp.</p> <p>Idle speed:</p> <p>Engage driving position, speed:</p> <p>Check lambda closed-loop control: Measurement with lambda closed-loop control tester (e.g. KDJE-P 600) and adapter lead (e.g. KDJE-P 600/52) at diagnosis socket outlet (pin 3). Alternatively: Current measurement using universal test adapter.</p> <p>Put fuel evaporation system out of operation.</p> <p>Determine on/off ratio (mean value) at n = 2500 min⁻¹.</p> <p>Deviation of on/off ratio (mean value) at idle compared to n = 2500 min⁻¹:</p> <p>Adjustment at idle-mixture-adjusting screw. After adjustment, repeat measurement.</p> | <p>650...750 min⁻¹</p> <p>550...650 min⁻¹</p> <p>-10...+10 %</p> |

TEST SPECIFICATIONS (CONTINUED)

| No. | Testing/Test condition | Test specification |
|-----|--|---------------------------------------|
| 12 | <p>Signal, air-flow sensor potentiometer:</p> <p>(Checking necessary when poor idle and/or part-load behavior)</p> <p>Measurement using test adapter and voltmeter.</p> <p>Determine supply voltage of potentiometer: Set value (test adapter, V-position 10):</p> <p>Determine potentiometer signal at idle speed. (Test adapter, V-position 11) Set value corresponding to supply voltage:</p> <p>Adjust signal if necessary at trimming potentiometer (at right next to potentiometer pins).</p> <p>Afterwards, re-secure adjusting screw of trimming potentiometer using black sealing compound (e.g Teroson).</p> | <p>4,35...5,35 V</p> <p>See chart</p> |



U 1 = Supply voltage
potentiometer

U 2 = Potentiometer
voltage signal

SELF-DIAGNOSIS

All Daimler-Benz 4- and 6-cylinder engines in the current series (approx. 10.85) are equipped with self-diagnosis using on-off ratio measurement.

Incorrect input signals from the KE-Jetronic control unit can be displayed with the lambda closed-loop tester at the lambda test output (diagnosis socket, socket 3).

This provides information on short and open circuits. Defects which occur sporadically (e.g. loose contacts) are not indicated. Output of fault signals has priority over output of the lambda closed-loop signal.

We will not go into the defects which can be indicated in more detail here, since the input signals of the KE-Jetronic control unit can be tested with the universal test adapter (rapid-diagnosis chart).

However, if when testing the lambda closed-loop control by means of on-off ratio measurement, a constant on-off ratio is indicated, then the input signals of the KE-Jetronic control unit should be tested (rapid diagnosis chart).

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER
ETT 018.01 WITH KE3 ADAPTER LEAD
1 684 463 169 AND APPROPRIATE MULTITESTER:

The following rapid diagnosis chart makes it possible for the experienced Jetronic expert to quickly check the electric/electronic peripheral and control-unit functions of the the KE-Jetronic, including the lambda closed-loop control.

Important note on the rapid diagnosis chart:

The "Test conditions" column gives information as to in which test steps the control-unit plug must be connected/disconnected. Make absolutely certain that there is no current at the system when connecting or disconnecting, i.e. the ignition must be switched off and the electric safety circuit must not be short circuited.

The "Test connections" column provides information about the leads connected to the respective measuring path, referring to the assignment in the control-unit plug. Possibly necessary trouble-shooting is with regard to these leads.

A t t e n t i o n :

When carrying out the test, make sure that the trimming plug is in position 1.

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

| No. | Switch/Btn V Ω Bt n | Under test | Test pins | Test conditions | Test specifications |
|-----|---------------------------------|---|--------------|--|--|
| 1 | V 4 | Internal resistance (R _i) pressure actuator | 12-10 | Disconnect control-unit plug. | 20...30 Ω |
| 2 | V 5 | Resistance NTC II (engine) | 21- 2 | Engine temperature +15...+30°C; approx. +80°C: | 1,3...3,6 k Ω 250...390 Ω |
| 3 | | Resistance NTC I (intake air) | | Air temperature in area of NTC I = +15...+30°C: | Test step not applicable |
| 4 | V 6 | Signal, altitude sensor | 11- 2 | Connect control unit. Switch on ignition. Voltmeter connection to blue Ω -sockets. Signal altitude-dependent: 0 meters (sea level): 500 meters: 1000 meters: 1500 meters: 2000 meters: 3000 meters: | 3,2...4,5 V 2,8...4,0 V 2,4...3,5 V 2,0...3,0 V 1,6...2,5 V 0,8...1,6 V |
| 5 | V 9 | Throttle-valve switch, idle | 13- 2 | Switch off ignition. Disconnect control-unit lead plug. Throttle valve closed: open: | 0...10 Ω > 1000 Ω |
| 6 | V 10 | Throttle-valve switch, full load | 5- 2 | Throttle valve closed: fully open: | > 5000 Ω 0...10 Ω |
| 7 | V 11 | Microswitch idle linkage | 24- 2 | Throttle valve closed: open: | 0...10 Ω infinite Ω |
| 8 | V 12 | Ground, control unit | 20- 2 | | 0...10 Ω |
| 9 | V 13 | Ground, pin 7 | 7- 2 | Switch off ignition. Connect control unit. | 0...10 Ω |

Rapid diagnosis chart for universal test adapter ETT 018.01 (continued)

| No. | Switch/Btn V | Ω | Bt n | Under test | Test pins | Test conditions | Test specifications |
|-----|-----------------|----------|---------|--|--------------|---|---|
| 10 | I V | 14 | - | Trimming plug Mixture map | 22- 2 | Disconnect control-unit plug. Disconnect lead plug from air-flow sensor potentiometer and connect socket 1 of plug (in upper installation position) to engine ground. Trimming-plug position 1: 2: 3: 4: 5: 6: 7: | 0...10 Ω ____ Ω ____ Ω ____ Ω ____ Ω ____ Ω ____ Ω |
| 11 | I V | 15 | - | Transmission switch (only automatic transmission) | 16- 2 | Connect air-flow sensor potentiometer. Selection lever position P, N: Driving position selected: | 0...10 Ω infinite Ω |
| 12 | 5 | - | - | TD signal | 25- 2 | Start engine (starting motor): | Voltage undefined |
| 13 | 6 | - | - | Control-unit supply | 1- 2 | Switch on ignition: | 8...15 V |
| 14 | 7 | - | - | Idle actuator supply and continuity | 3- 2 | Switch on ignition: | 8...15 V |
| 15 | 8 | - | - | Tempomat signal | 6- 2 | Switch Tempomat operation: | _____ V |
| 16 | 9 | - | - | Air-conditioner cut-in signal | 19- 2 | Switch off ignition. Connect control unit. Start engine, switch on air conditioner. Temperature regulator = Minimum temperature | 8...15 V |
| 17 | 10 | - | - | Supply, air-flow sensor potentiometer | 18- 2 | Switch on ignition: | 4,35...5,35 V |

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

| No. | Switch/ V | Btn Ω | Under test | Test pins | Test conditions | Test specifications |
|-----|--------------|-----------------|------------|---|--|---|
| 18 | 11 | - | - | Signal, air-flow sensor potentiometer | 17- 2 Switch on ignition. Air-flow sensor plate in neutral position: Deflect air-flow sensor plate by hand, continuous rise up to max.: | 0 V 5,35 V |
| 19 | 13 | - | 1 | Temperature signal from control unit | 9- 2 Switch on ignition. While actuating btn 1: | 1,5...1,9 V |
| 20 | 14 | - | - | Consumption signal | 4- 2 Start engine - idle: With regulation: | Voltage undefined Voltage change |
| 21 | - | - | - | Peak coil current | 12-12 Switch on ignition: | ->FD _____ : _____ mA FD 648->: 18...22 mA |
| 22 | - | 21 | 1 | Warm-up enrichment + 20° C | 12-12 Warm up engine - idle. Current value with btn 1 pressed: | ->FD _____ : _____ mA FD 648->: 2...5 mA |
| 23 | - | 24 | 2 | Actuator current engine at normal operating temperature | 12-12 Engine at normal operating temperature, idle. Current value with btn 2 pressed; reading oscillating, mean value: | ->FD _____ : _____ mA FD 648->: -1...+1 mA |
| 24 | - | 21 | 2 | Starting enrichment | 12-12 So that engine fails to start: Disconnect speed relay for electric fuel pump. Short circuit ignition coil term.4 to ground via resistance of at least 2k Ω . (e.g. with sleeve-type suppressor and spark gap) While btn 2 pressed, actuate starting motor. Current rise (max. 1 sec.) to: | ->FD _____ : _____ mA FD 648->: 40...60 mA |

FD = Date of manufacture

A15 _____ <==>

A16 _____ <==>

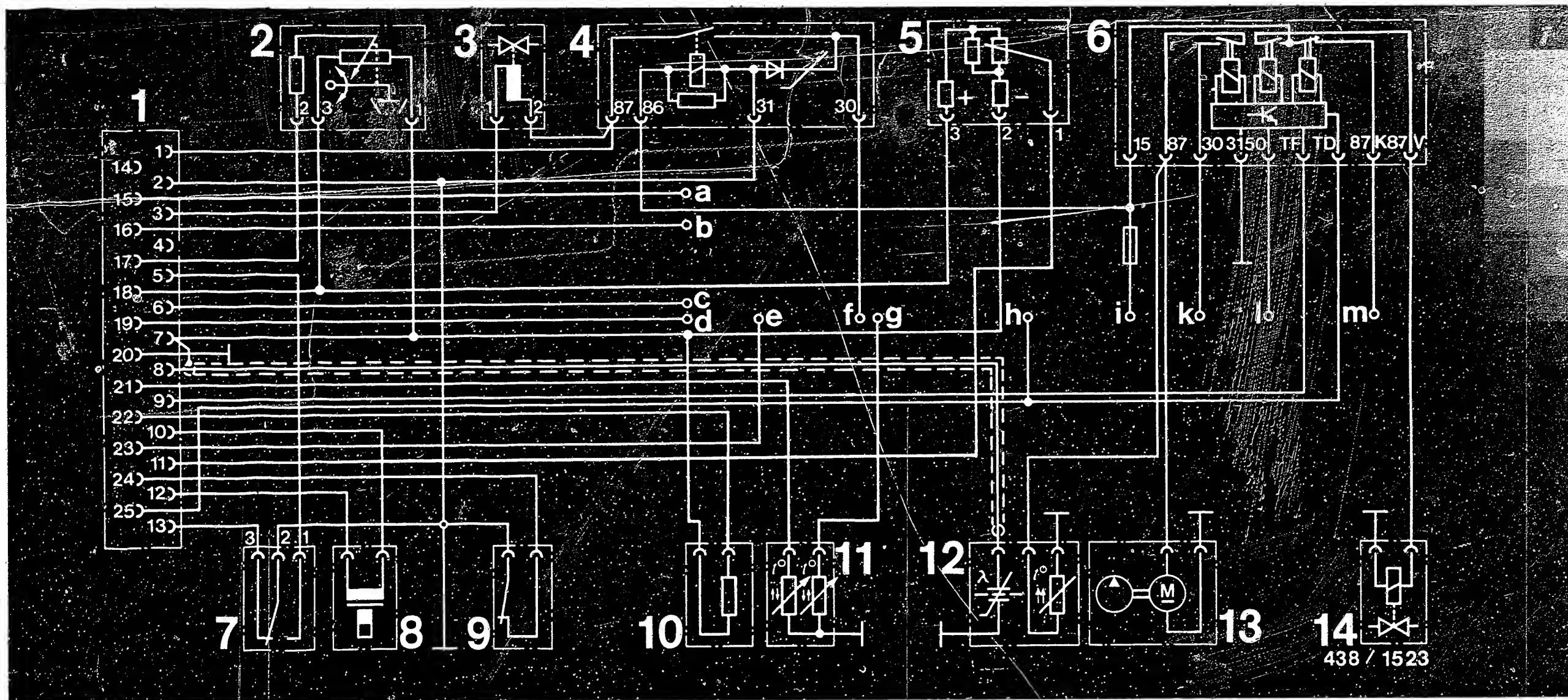
| No. | Switch/ V | Btn Ω | Under test Bt n | Test pins | Test conditions | Test specifications |
|-----|--------------|-----------------|-----------------------|--------------|--|--|
| 25 | - | 21 | 1 | 12-12 | Start engine (at normal operating temperature) while actuating btn 1. Current value: Current value constant for a few seconds, then slow speed regulation. | ->FD _____ : _____ mA FD 648->: 4...8 mA |
| 26 | - | 21 | 1 | 12-12 | Engine at normal operating temperature, idle. While actuating btn 1, perform snap acceleration of engine. Thus current rise (approx. 1 sec.) to: Note: Level of current value dependent upon intensity of acceleration (travel/duration of air-flow sensor plate movement). | ->FD _____ : _____ mA FD 648->: 40...60 mA |
| 27 | - | - | - | 12-12 | Re-connect ohmmeter (swap positive and negative). Start engine (normal operating temperature). Drive vehicle on chassis dynamometer or road. Increase speed n briefly to at least approx.: Current reading during falling speed phase: (idle throttle-valve switch closed) | ->FD _____ : _____ min ⁻¹ FD 648->: 2000 min ⁻¹ -40...-80 mA |

FD = Date of manufacture

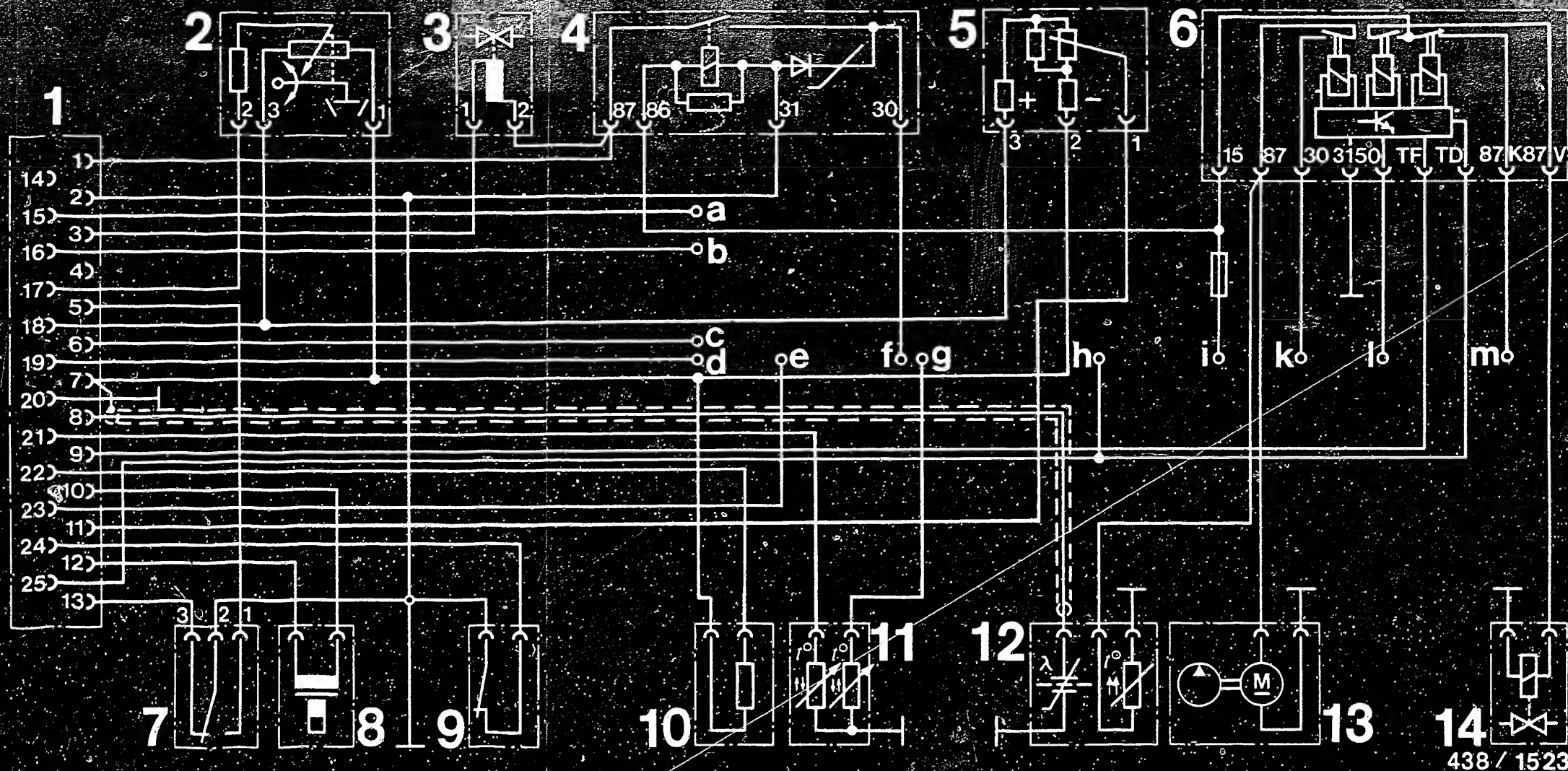
RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

| No. | Switch/ V | Btn Ω | Btn n | Under test | Test pins | Test conditions | Test specification CAT |
|-----|--------------|----------|----------|--|--------------|--|--|
| 28 | - | 24 | - | Full-load enrichment | 12-12 | <p>Engine at normal operating temperature, idle.</p> <p>Reading oscillating, mean value:</p> <p>Briefly push accelerator pedal to floor (full-load throttle-valve switch must switch).</p> <p>During speed rise, current value rises by:</p> <p>A t t e n t i o n: Do this very briefly, so that speed does not rise too much and engine is not damaged.</p> | <p>->FD —: — mA FD 648 ->: -1...+1 mA</p> <p>->FD —: — mA FD 648 ->: 6...10 mA</p> |
| 29 | - | 21 | - | Lambda closed-loop control, open-loop control mode | 12-12 | <p>Disconnect regeneration lead to throttle-valve assembly at generation valve and seal.</p> <p>Engine at norm. op. temp., idle. Current value:</p> | -1...+1 mA |
| 30 | - | 24 | - | Lambda closed-loop control, closed-loop control mode | 12-12 | <p>Engine at norm. op. temp., idle.</p> <p>Closed-loop control mode can be recognized from the oscillating current reading.</p> <p>Mean value:</p> <p>If mean value outside tolerance, set (idle-mixture-adjusting screw) to approx.:</p> | <p>-1...+1 mA</p> <p>0 mA</p> |
| 31 | - | 22 | - | Lambda closed-loop control, rich stop | 12-12 | <p>Engine at norm. op. temp., idle.</p> <p>Current rise to:</p> | 12...16 mA |
| 32 | - | 23 | - | Lambda closed-loop control, lean stop | 12-12 | <p>Engine at norm. op. temp., idle.</p> <p>Current drop to:</p> | -8...-12 mA |

*) FD = Date of manufacture



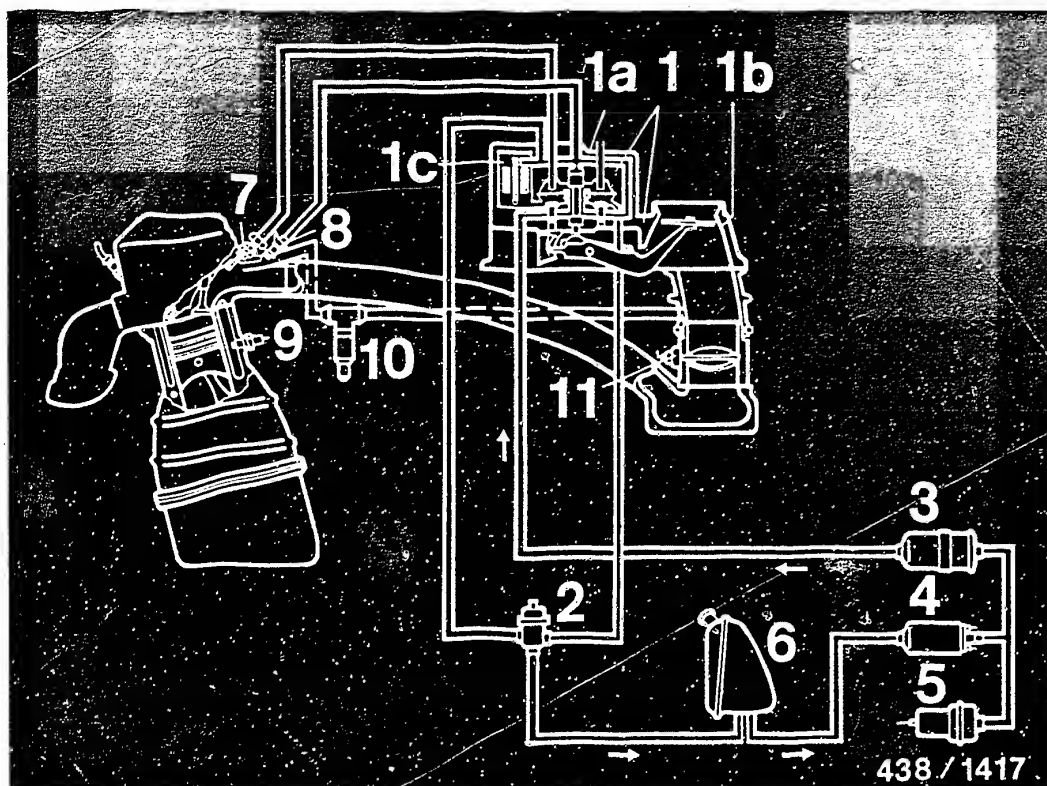
- | | |
|---|--|
| 1 = Control unit, KE-Jetronic | 8 = Electro-hydraulic pressure actuator |
| 2 = Air-flow sensor potentiometer | 9 = Throttle-valve switch, idle/linkage |
| 3 = Idle actuator | 10 = Trimmer resistor, mixture map |
| 4 = Over-voltage protection relay | 11 = Temperature sensor, engine (Double NTC) |
| 5 = Altitude sensor | 12 = Heated lambda sensor |
| 6 = Electronic relay for electric fuel pump and cold-start valve actuation | 13 = Electric fuel pump |
| 7 = Throttle-valve switch, idle/full load | 14 = Cold-start valve |
- ELECTRICAL TERMINAL DIAGRAM WITH ELECTRIC FUEL PUMP SAFETY CIRCUIT



a = Lambda malfunction indicator
b = Transmission switch
c = Connection, Tempomat operating element
d = Connection, air-conditioner control unit
e = Lambda test output (diagnosis socket outlet, socket 3)
f = Terminal 30

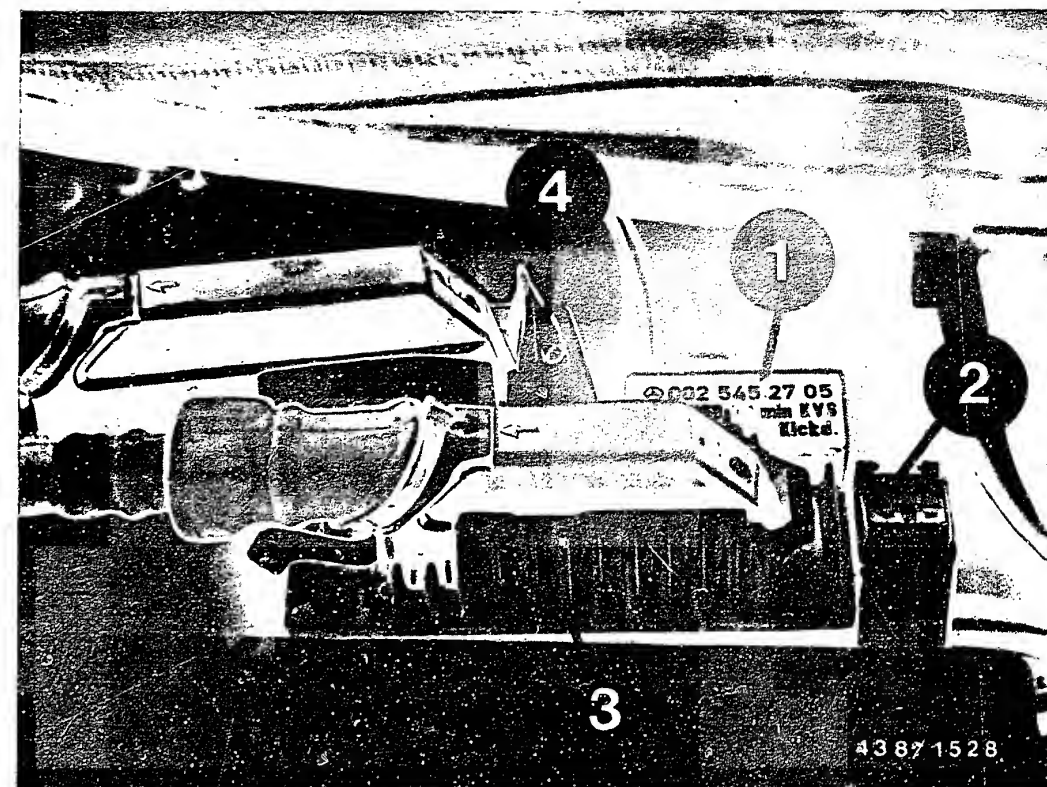
g = Ignition system (EI)
h = Terminal TD, ignition
i = Terminal 15
k = Terminal 30
l = Terminal 50
m = Kick-down switch, socket 1

ELECTRICAL TERMINAL DIAGRAM WITH ELECTRIC FUEL PUMP SAFETY CIRCUIT (CONTINUATION)



- 1 = Mixture-control unit
- 1a = Fuel distributor
- 1b = Air-flow sensor
- 1c = Electro-hydraulic pressure actuator
- 2 = Pressure regulator, primary pressure
- 3 = Fuel filter
- 4 = Electric fuel pump
- 5 = Fuel accumulator
- 6 = Fuel tank
- 7 = Injection valve
- 8 = Cold-start valve
- 9 = Temperature sensor engine (Double NTC)
- 10 = Idle actuator
- 11 = Throttle-valve switch, idle/full load

DIAGRAM OF AIR AND FUEL LINES

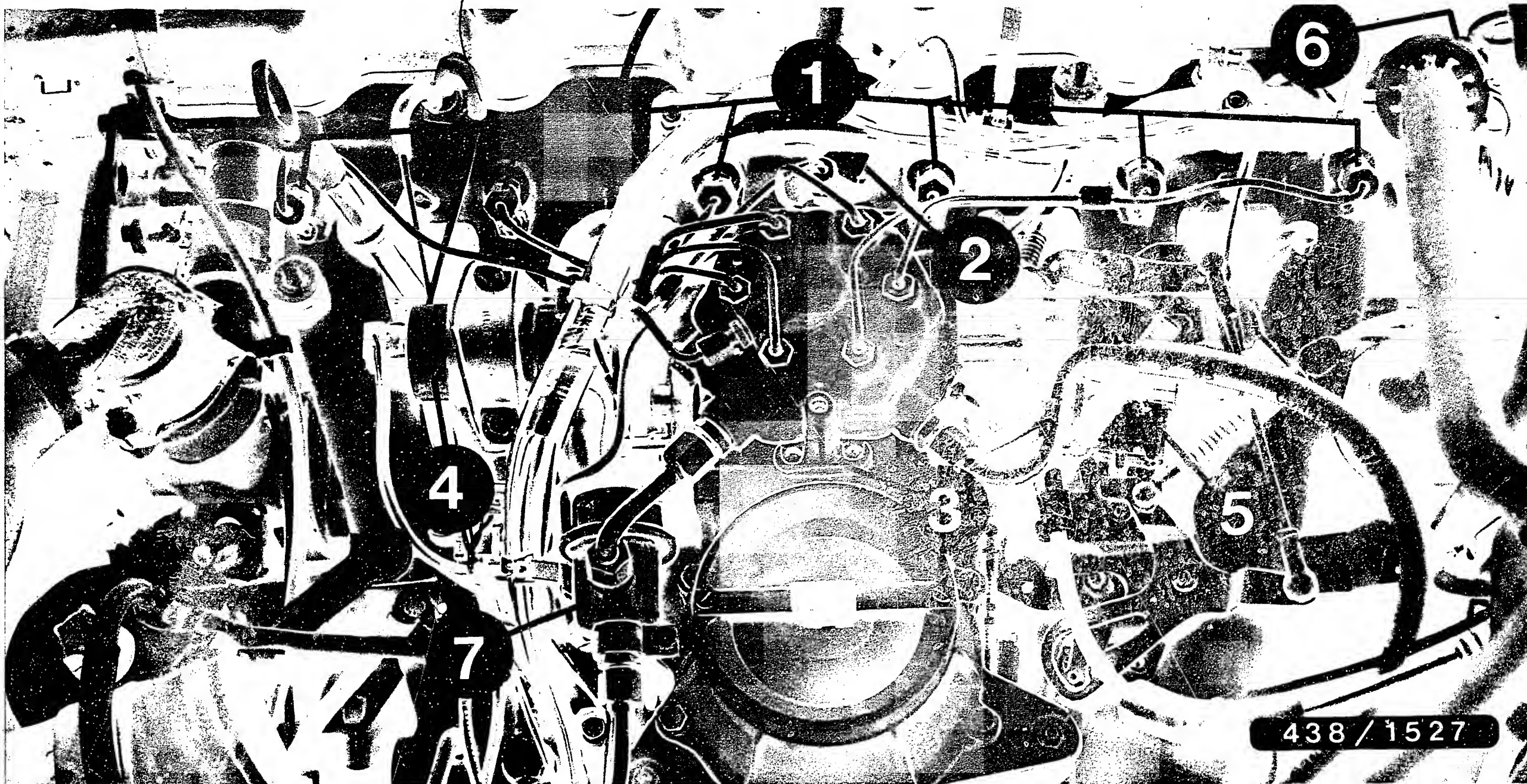


- 1 = Electronic relay for electric-fuel-pump and cold-start valve actuation
- 2 = Over-voltage protection relay
- 3 = KE-Jetronic control unit
- 4 = ABS controller (if present)

In Type 126, the electric fuel pump relay and the over-voltage protection relay are positioned in the engine compartment on the left.

The KE-Jetronic control unit and the mixture map trimming plug are installed in the footwell on the right behind the side panel in the Type 126.

INSTALLATION POSITION OF COMPONENTS



1 = Fuel-injection valves
 2 = Start valve
 3 = Mixture-control unit
 4 = Idle actuator

5 = Throttle-valve switch, idle
 (microswitch on accelerator linkage)
 6 = Engine-temperature sensor (concealed)
 7 = Pressure regulator

INSTALLATION POSITION OF COMPONENTS

Brief instructions : ALF-5001
BOSCH system : EI-K
Vehicle make : ALFA ROMEO
Basic microcard : PKW-030

TABLE OF CONTENTS

| Section | Coordinate |
|--|------------|
| Special features, usage, safety..... | 02 |
| Trouble-shooting chart..... | 04 |
| Self-diagnosis test chart..... | 07 |
| Rapid diagnosis chart..... | 11 |
| Test specifications..... | 19 |
| Electrical terminal diagram..... | 23 |
| Installation position of components, notes on removal and installation..... | 25 |

SPECIAL FEATURES

These brief instructions, valid at the time of publication, apply to the following Alfa Romeo model:

Alfa 75 Turbo, engine 061.34, year of manufacture 1986 Europe, Switzerland.

- * EI-K control unit 0 227 400 024
- * Trigger box 0 227 100 111
- * Ignition coil 1 227 020 010
- * Self-diagnosis (flashing code)
- * Characteristic-map change-over
- * Charge-air-pressure control

STRUCTURE, USAGE

These brief instructions contain essentially vehicle-specific special features and set values.

Corresponding to the customer complaint, the trouble-shooting chart leads to various causes/ component faults.

Detailed information for trouble-shooting must be taken from the basic instructions via the trouble-shooting chart.

NOTE :

Even if reference is made to basic instructions, the set values, terminal assignments and special features of these vehicle-related brief instructions are always binding.

SAFETY AND PRECAUTIONARY MEASURES

Keep people out of danger.
Avoid damage to the engine, trigger box
and control unit or ignition system.

* A T T E N T I O N !
High-performance ignition system.
Dangerous high and low voltages.

Do not make contact with parts or terminals
which carry voltage; danger, primary and
secondary ends.

* When testing compression, disconnect
trigger-box plug or f i r m l y
apply ignition coil term.4 to
ground using auxiliary cable.

N o t e :
Auxiliary cable must be interference-
suppressed by at least 2k Ω .

See basic instructions for further
precautionary measures.

TROUBLE-SHOOTING CHART

Customer complaint (fault symptoms)

1. Starting motor turns, engine fails to start
or starts only with great difficulty.
2. Engine starts
but then dies.
3. Uneven engine idle
(speed, exhaust).
4. Poor throttle
response.
5. Engine misfiring
(ignition, injection).
6. Engine lacks power/
maximum speed too low.
7. Fuel consumption too high.
8. Engine diesels.
9. Engine pings/knocks.
10. Engine becomes too hot.
11. Fault lamp.

| Cause (component fault) | | | | | | | | | | | |
|-------------------------|---|---|---|---|---|---|---|---|---|---|---|
| * | * | * | * | * | * | * | * | * | * | * | Self-diagnosis |
| * | | * | * | * | | | | | | | High-voltage end |
| * | | * | * | * | | | | | | | Ignition coil |
| * | | | | | | | | | | | Firing sequence |
| * | | | | | | | | | | | Voltage, trigger box |
| * | | | | | | | | | | | Voltage, primary circuit |
| * | | | | | | | | | | | Voltage, EI-K control unit |
| * | | | | | | | | | | | Ignition-distributor plug and socket |
| * | | | | | | | | | | | Voltage, magnetic pulse generator |
| * | | | | | | | | | | | Magnetic pulse generator, operation |
| * | | | | | | | | | | | EI-K control unit, operation |
| * | | | | | | | | | | | Ignition-distributor, adjustment on assembly |

TROUBLE-SHOOTING CHART (CONTINUED)

Customer complaint (fault symptoms)

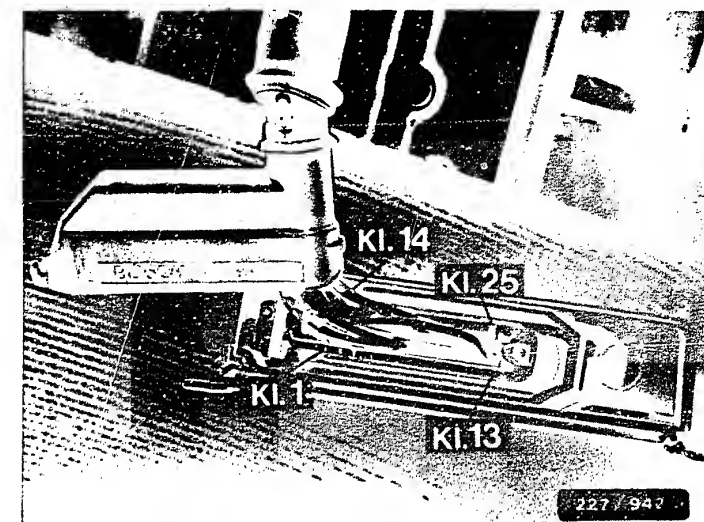
1. Starter turns, engine fails to start or starts only with great difficulty.
2. Engine starts but then dies.
3. Uneven engine idle (speed, exhaust).
4. Poor throttle response.
5. Engine misfiring (ignition, injection).
6. Engine lacks power/maximum speed too low.
7. Fuel consumption too high.
8. Engine diesels.
9. Engine pings/knocks.
10. Engine becomes too hot.
11. Fault lamp.

| | | | | | | | |
|---|---|---|---|---|---|-----|----------------------------------|
| | | | | | | | Cause (component fault) |
| * | | | | | | | Speed signal (Jetronic) |
| * | | * | | | | | Contact resistances |
| | | | | | | * ✓ | Fault lamp |
| | * | * | * | * | | | Idle throttle-valve switch |
| | * | * | * | * | * | * | Basic ignition setting |
| | | | * | * | | * | Fuel enrichment |
| | * | | * | * | * | * | Charge-air-pressure timing valve |
| | | * | | | | | Voltage, trigger box |
| | | * | | | | | Voltage, ignition coil |
| | | * | | | | | Primary voltage |

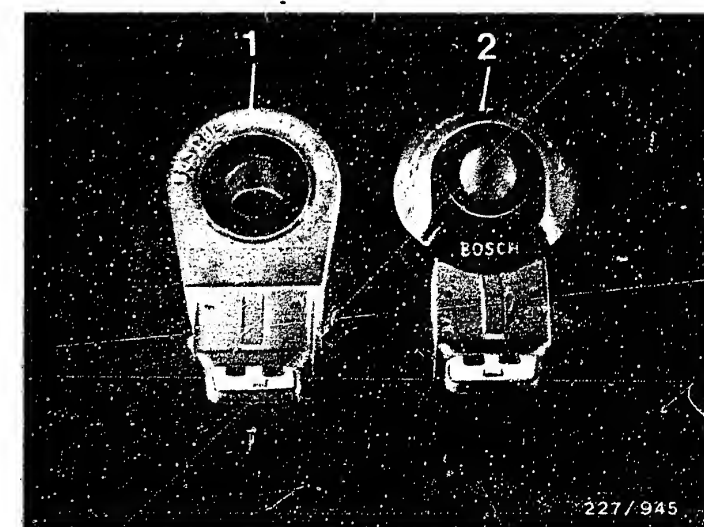
For production reasons:
continued on the following
coordinate.

SELF-DIAGNOSIS TEST CHART

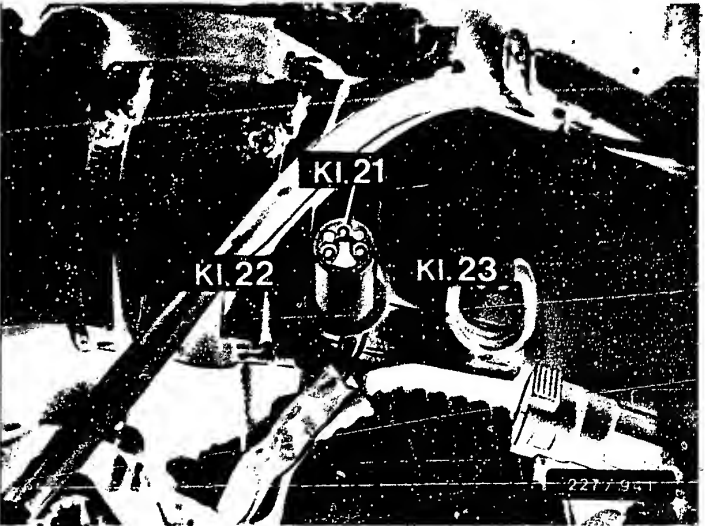
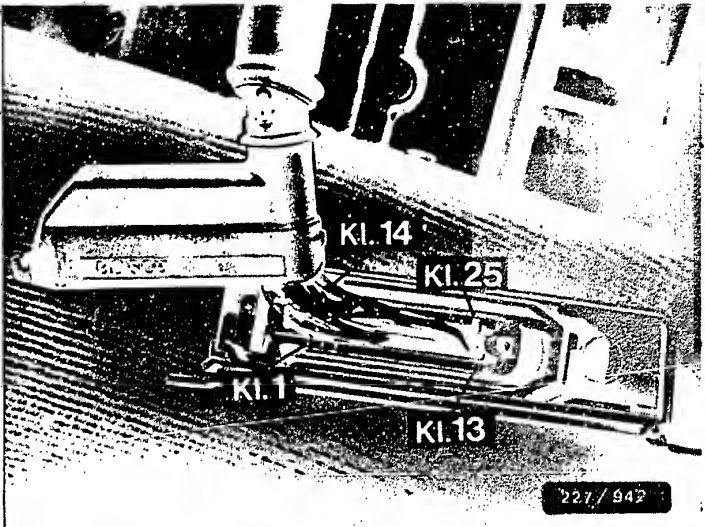
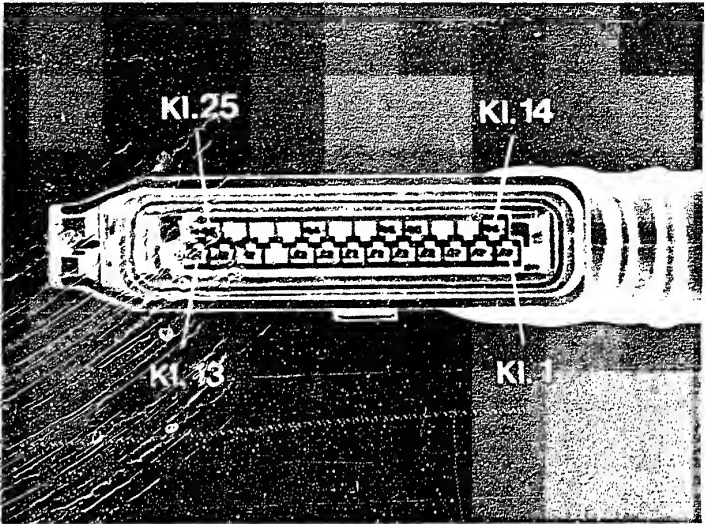
| Fault indication Flashing code | Testing of components / function Test instructions / conditions | Terms. | Set values |
|-----------------------------------|--|-----------------|--|
| 1 1 | <p>MAXIMUM RETARDATION OF KNOCK CONTROL OBTAINED.</p> <p>Octane rating of fuel too low.</p> <p>Test valve clearance, overpressure valve of exhaust turbo-supercharger, fuel-injection system. Main-bearing damage or abnormal engine noises.</p> | — | — |
| 1 2 | <p>VOLTAGE SUPPLY, EI-K CONTROL UNIT</p> <p>Engine at idle.</p> <p>Voltage at EI-K control-unit plug with handle cover removed.</p> <p>See upper illustration.</p> | 6 20 (+) (-) | equal to / greater than 10.5 V |
| 2 1/ 2 2 | <p>KNOCK SENSOR</p> <p>Visual examination, knock-sensor plug — for oxidation.</p> <p>Resistance, EI-K control-unit plug (not applicable for "new" version).</p> <p>Tightening torque, "old" version.</p> <p>"new" version.</p> <p>See lower illustration for versions.</p> | 12 13 | <p>270...370 Ω</p> <p>11...15 Nm</p> <p>15...25 Nm</p> |
| 2 3 | <p>EI-K CONTROL UNIT, KNOCK-EVALUATION CIRCUIT. Replace EI-K control unit.</p> | — | — |
| 3 1 | <p>LOAD SIGNAL</p> <p>Engine at idle.</p> <p>Dwell angle, EI-K control-unit plug with handle cover removed. See upper illustration. Read off dwell angle.</p> <p>Briefly apply full throttle.</p> <p>Read off dwell angle.</p> | 8 B- (+) (-) | Noticeable change of dwell angle |



1 = Old version
2 = New version

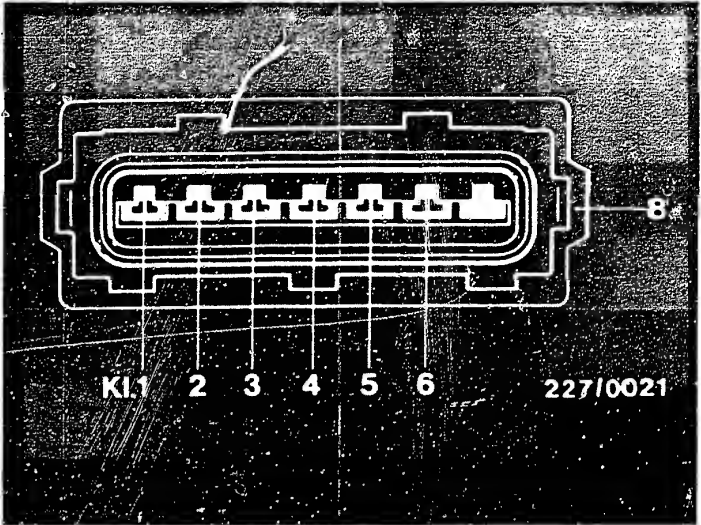


| Fault indication Flashing code | Testing of components / function Test instructions / conditions | Terms. | Set values |
|-----------------------------------|---|--|--|
| 4 1 | <p>ANGLE-OF-ROTATION SENSOR, INPUT VOLTAGE TOO LOW.</p> <p>Disconnect EI-K control-unit plug. Pull apart angle-of-rotation-sensor plug connection.</p> <p>1.Voltage, battery and EI-K control-unit plug. See upper illustration.</p> <p>2.Connect angle-of-rotation-sensor plug. Ignition ON. Voltage, EI-K control-unit plug (connected) with handle cover removed. See center illustration.</p> <p>3.Voltage, EI-K control-unit plug. The voltage measured at point 2 multiplied by 0.21 gives set value. If necessary, adjust angle-of-rotation sensor. <u>Note:</u> At points 2 and 3, use only voltmeter with R_i greater than 100k Ω and resolution of 10 mV.</p> | <p>B+ 22 (+) (-)</p> <p>21 23 (+) (-)</p> <p>22 23 (+) (-)</p> | <p>0 V</p> <p>3.5...4.5 V</p> <p>Voltage at point 2 x 0.21</p> |
| 4 2 | <p>ANGLE-OF-ROTATION SENSOR, INPUT VOLTAGE TOO HIGH</p> <p>Resistance, EI-K control-unit plug. See upper illustration.</p> <p>Pull apart angle-of-rotation-sensor plug connection. Ignition ON.</p> <p>Voltage, angle-of-rotation sensor plug. See lower illustration.</p> | <p>21 22</p> <p>22 B- (+) (-)</p> | <p>3.2...4.8 k Ω</p> <p>0 V</p> |



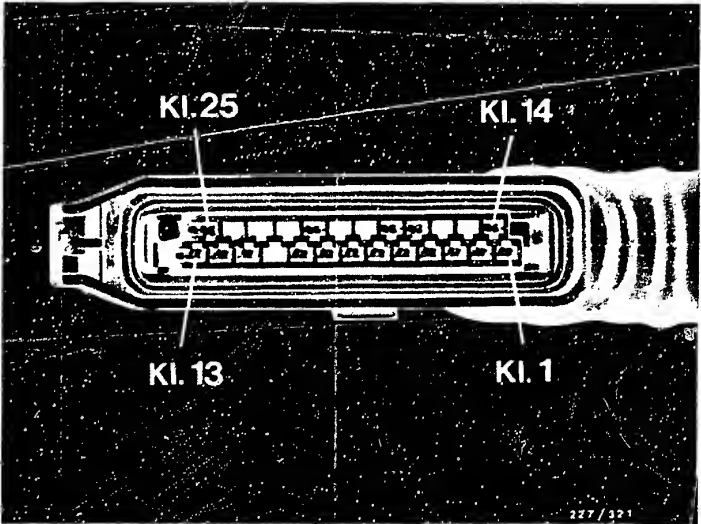
RAPID DIAGNOSIS CHART

| Test step | Testing of components / function Test instructions / conditions | Terms. | Set values |
|-----------|--|-----------------|--|
| 1 | HIGH VOLTAGE END Test operation of e.g. spark plugs, ignition harness, distributor cap (e.g. open circuit, shunt). Assessment, for example, by ignition oscillogram, resistance measurement, visual check. | — | — |
| 2 | IGNITION COIL Resistance, primary Resistance, secondary | 1 15 1 4 | 0.7... 1.2 Ω 6.9...11.9 k Ω |
| 3 | VOLTAGE SUPPLY, TRIGGER BOX Disconnect trigger-box plug. Ignition ON. Voltage, trigger-box plug. See upper illustration. | 4 2 (+) (-) | Battery voltage |
| 4 | VOLTAGE SUPPLY, PRIMARY CIRCUIT Ignition ON. Voltage, trigger-box plug. See upper illustration. | 1 2 (+) (-) | Battery voltage |
| 5 | VOLTAGE SUPPLY, EI-K CONTROL UNIT Disconnect EI-K control-unit plug. Ignition ON. Voltage, EI-K control-unit plug. See lower illustration. | 6 20 (+) (-) | Battery voltage |



8 = Trigger-box plug

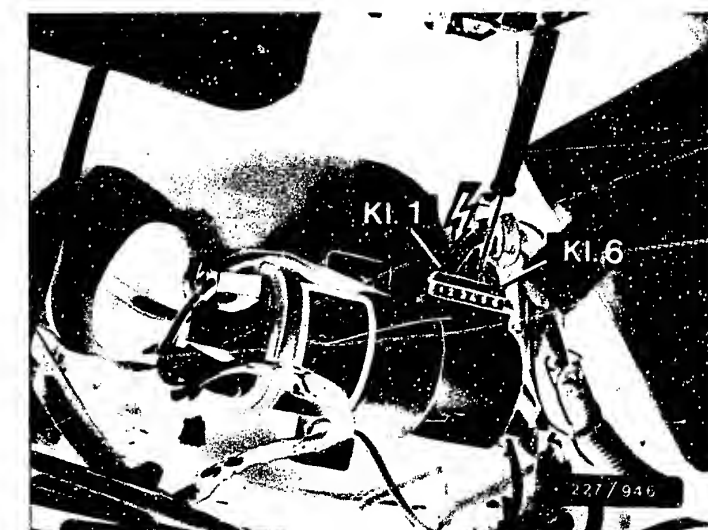
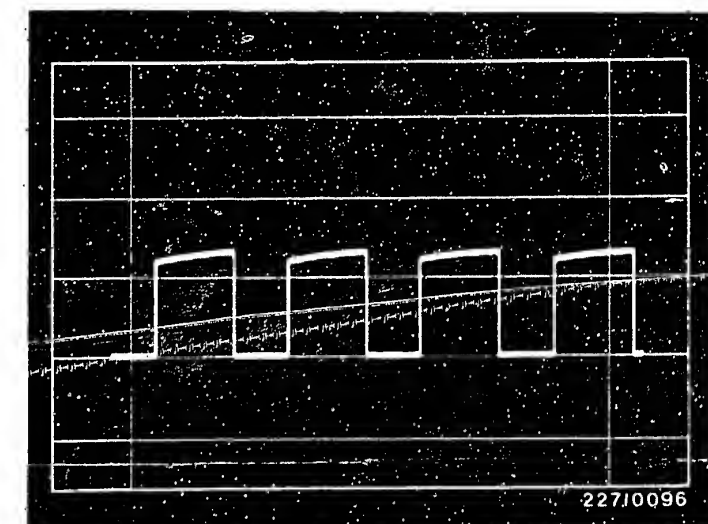
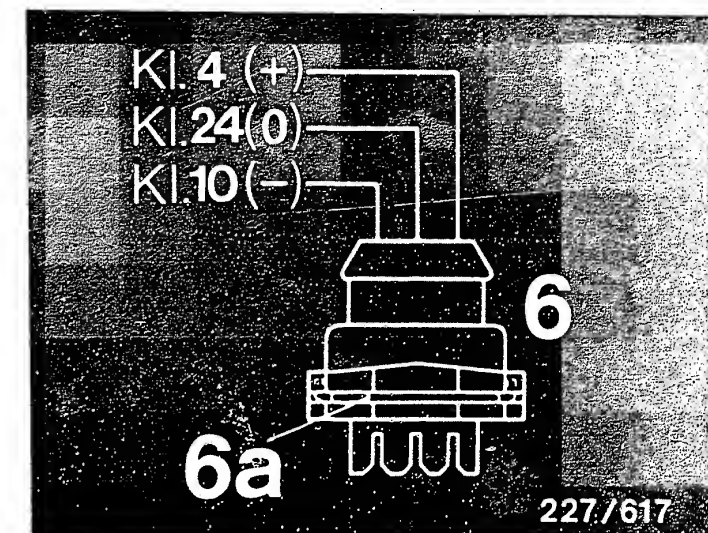
EI-K control-unit plug



RAPID DIAGNOSIS CHART (CONTINUED)

| Test step | Testing of components / function Test instructions / conditions | Terms. | Set values |
|-----------|---|------------------------------------|-------------------------------------|
| 6 | MAGNETIC PULSE GENERATOR Visual check, ignition-distributor plug and socket for oxidization. | — | — |
| 7 | VOLTAGE SUPPLY, MAGNETIC PULSE GENERATOR Connect ignition-distributor plug and EI-K control-unit plug. Ignition ON. Voltage at ignition-distributor plug. See upper illustration. | 4 10 (+) (-) | equal to/greater than 10 V |
| 8 | MAGNETIC PULSE GENERATOR - OPERATION Start engine. "Special" oscilloscope to ignition-distributor plug. See upper illustration. | 24 B- (+) (-) | Rectangular pulse (center illustr.) |
| 9 | EI-K CONTROL UNIT - OPERATION Connect trigger-box plug. Start engine. "Special" oscilloscope to trigger-box plugs in turn. See lower illustration. | 5 B- (+) (-) 6 B- (+) (-) | Rectangular pulse (center illustr.) |
| 10* | IGNITION DISTRIBUTOR - ADJUSTMENT ON ASSEMBLY Cyl. 1 of engine at TDC. Center of distributor rotor points to marking on housing. | — | — |

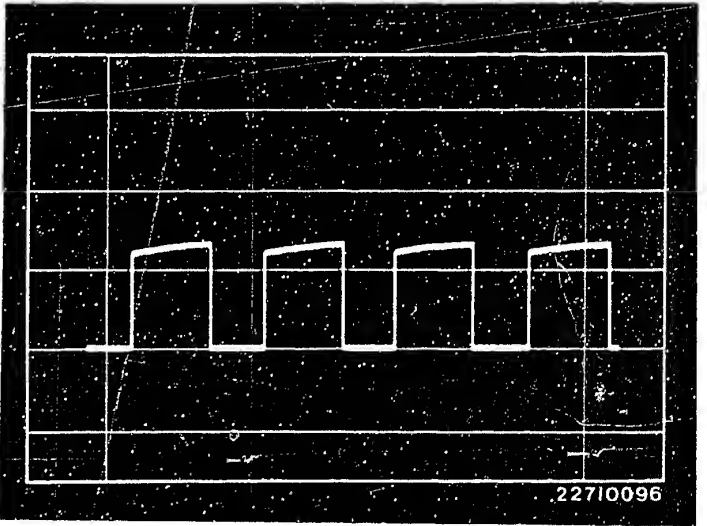
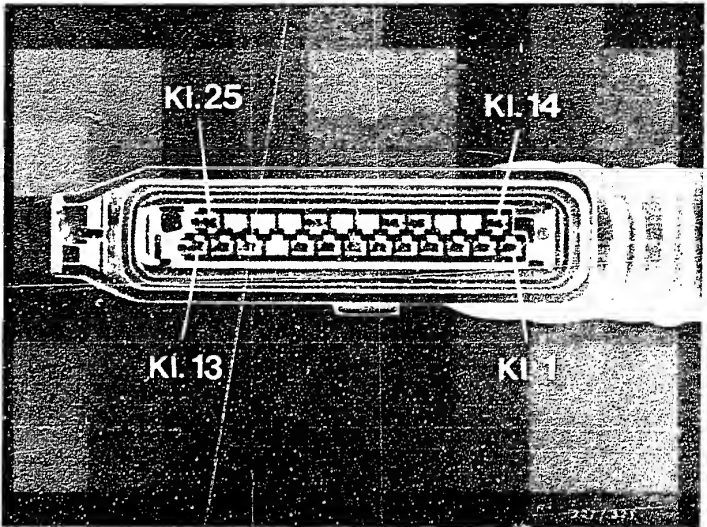
* Perform only when engine not running.



RAPID DIAGNOSIS CHART (CONTINUED)

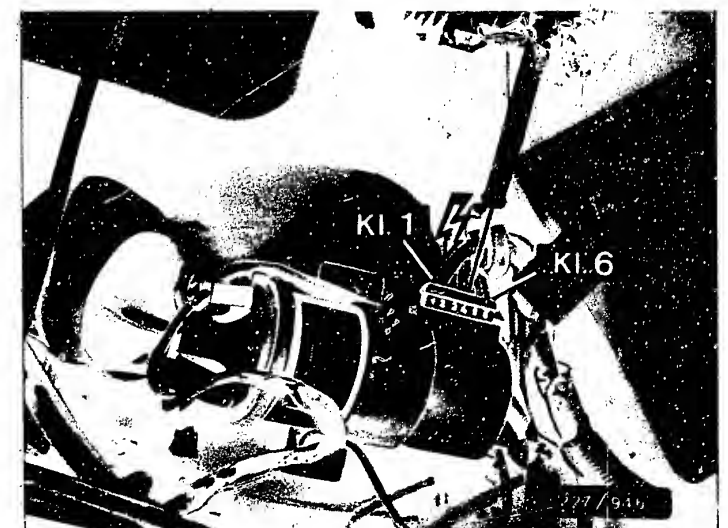
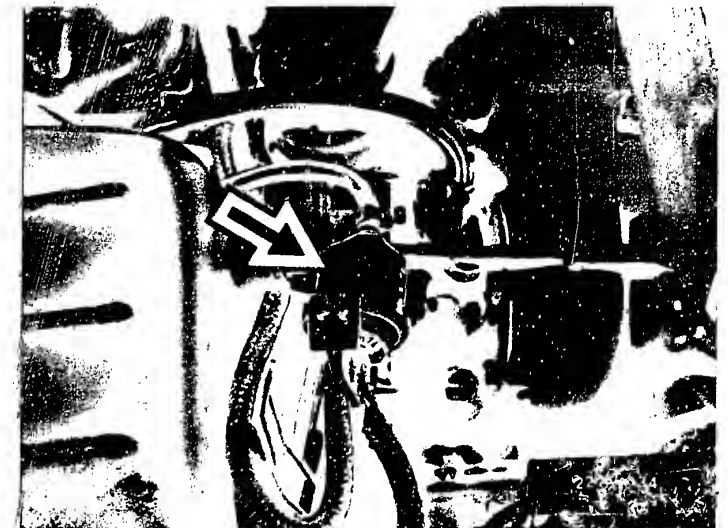
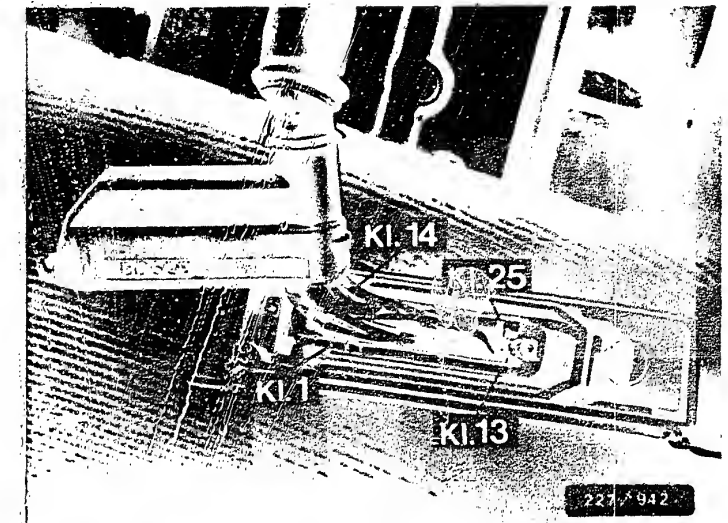
| Test step | Testing of component/function Test instructions/conditions | Termi- nals | Set values |
|-----------|--|----------------|--|
| 11* | ENGINE-SPEED SIGNAL Disconnect Jetronic control-unit plug. See upper illustration. Start engine. Oscilloscope "Special" to Jetronic control-unit plug. | 1 B- (+)(-) | Rectangular pulse (center illustration) |
| 12* | CONTACT RESISTANCES Test voltage-supply leads from trigger box and primary circuit for contact resistance. | Var- ious | Max. 0.3 Ω (per current circuit) |
| 13 | FAULT LAMP Connect Jetronic control-unit plug. Ignition ON. Self-diagnosis switch ON. Engine at idle. | | Fault lamp lights Fault lamp OFF / flashes |
| 14 | THROTTLE-VALVE SWITCH - IDLE Engine at normal operating temperature. Engine at approx. 3000 min ⁻¹ . Read off spark-advance angle. Close idle throttle-valve switch by hand (as far as it will go). | — | Spark-advance-angle change |
| 15 | BASIC IGNITION SETTING Disconnect both throttle-valve-switch plugs (idle) and jump using auxiliary lead. Run engine at 850...950 min ⁻¹ . Marking P = TDC, F = 9° before TDC. See lower illustration. | — | 9 ± 1 ° before TDC |

*Perform only when engine is not running.



RAPID DIAGNOSIS CHART (CONTINUED)

| Test step | Testing of components / function Test instructions / conditions | Terms. | Set values |
|-----------|--|-------------------------------|--|
| 16 | FUEL ENRICHMENT Bridge EI-K control-unit plug with handle cover removed using auxiliary lead. See upper illustration. Engine at idle. Voltage, EI-K control-unit plug. | 21 22 18 B- (+) (-) | 0 V up to max. 1 V |
| 17 | CHARGE-AIR-PRESSURE TIMING VALVE Bridge EI-K control-unit plug with handle cover removed using auxiliary lead. See upper illustration. Run engine at approx. 2500 min ⁻¹ . | 21 22 | Timing valve operating (feelable) Center illustration |
| 18 | VOLTAGE SUPPLY, TRIGGER BOX Engine at idle. Voltage, trigger-box plug. See lower illustration. | 4 2 (+) (-) | 12...14 V max. 1V below U _B |
| 19 | VOLTAGE SUPPLY, IGNITION COIL Engine at idle. Voltage, ignition coil and battery. | 15 B- (+)(-) | equal to / greater than 10 V |
| 20 | PRIMARY VOLTAGE Engine at idle. Oscilloscope with <u>pulse shaper</u> at ignition coil | various | 290...370 V |



TEST SPECIFICATIONS

| | |
|--|--|
| Voltage supply EI-K control unit with engine at idle | equal to/greater than 10.5 V |
| Knock sensor "OLD" Knock sensor "NEW" | 270...330 k Ω |
| Tightening torque: Knock sensor "OLD" Knock sensor "NEW" | 11...15 Nm 15...25 Nm |
| Angle-of-rotation sensor Term.21 and term.22 | 3.2...4.8 k Ω |
| Ignition coil, primary Ignition coil, secondary | 0.7... 1.2 Ω 6.9...11.9 k Ω |
| Voltage supply trigger box with ignition ON | Battery voltage |
| Voltage supply primary circuit with ignition ON | Battery voltage |
| Voltage supply EI-K control unit with ignition ON | Battery voltage |
| Voltage supply magnetic pulse generator with ignition ON | equal to/greater than 10 V |

TEST SPECIFICATIONS (continued)

| | |
|---|--|
| Magnetic pulse generator - operation at cranking speed | Rectangular pulse |
| EI-K control units - operation at cranking speed | Rectangular pulse |
| Ignition distributor - adjustment on assembly | Cyl.1 at TDC Ign.-distr. marking |
| Speed signal at cranking speed | Rectangular pulse |
| Contact resistance supply leads, trigger box and primary circuit | max. 0.3 Ω (per current circuit) |
| Fault lamp Ignition ON engine at idle | lights OFF/ flashes |
| Basic ignition setting throttle-valve switch bridged | 9 \pm 1° before TDC at 850... 950 min ⁻¹ |
| Fuel enrichment engine at idle | 0 V up to max. 1V |

TEST SPECIFICATIONS (continued)

| | |
|---|--------------------------------------|
| Charge-air-pressure timing valve EI-K control-unit plug term.21 and term.22 bridged run engine at approx.2500 min -1 | Timing valve operating (feelable) |
|---|--------------------------------------|

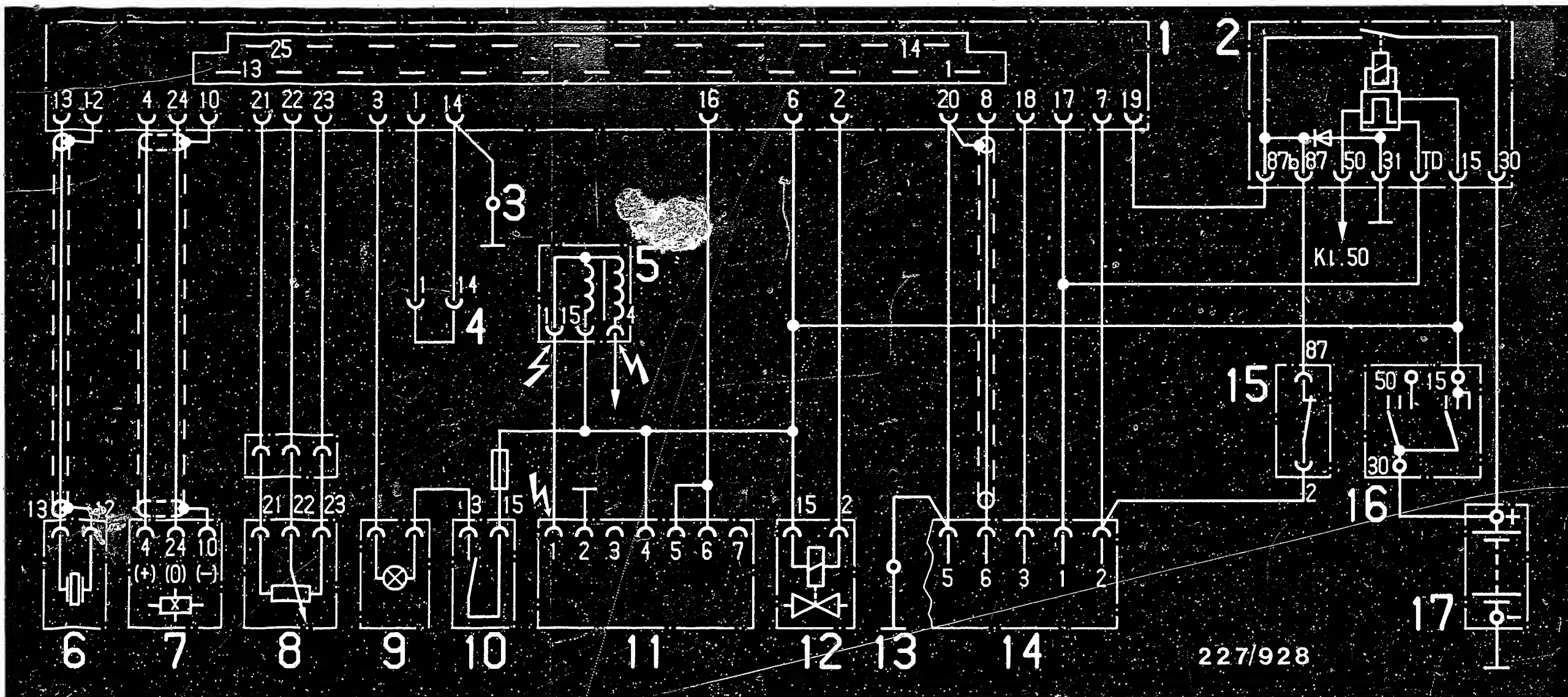
| | |
|--|---------------------------------|
| Voltage supply trigger box with engine at idle | 12...14 V max. 1 V below V B |
|--|---------------------------------|

| | |
|--|-------------------------------|
| Voltage supply ignition coil with engine at idle | equal to/greater than 10 V |
|--|-------------------------------|

| | |
|--|-------------|
| Primary voltage with engine at idle | 290...370 V |
|--|-------------|

For production reasons:
continued on the following
coordinate.

See SIS microcard Jetronic and/or Autodata
test specifications for settings for idle
speed, exhaust gas, valve clearance, etc.



High-voltage symbols: Danger 400 V...25 kV

- 1 = EI-K control-unit plug
- 2 = Electric-fuel-pump relay
- 3 = Ground (intake manifold, rear)
- 4 = Characteristic-map change-over
- 5 = Ignition coil

- 6 = Knock sensor
- 7 = Magnetic pulse generator
- 8 = Angle-of-rotation sensor
- 9 = Fault lamp
- 10 = Self-diagnosis switch
- 11 = Trigger box

- 12 = Charge-air-pressure timing valve
- 13 = Ground (valve cover, right, at auxiliary-air device)
- 14 = KE-Jetronic control unit
- 15 = Idle throttle-valve switch
- 16 = Ignition and starting switch
- 17 = Battery

ELECTRICAL TERMINAL DIAGRAM

B23

B24

INSTALLATION POSITION OF COMPONENTS

The EI-K control unit is positioned in the passenger compartment at the front on the right.

The Jetronic control unit is positioned in the footwell on the front passenger's side.

Ignition coil, trigger box and electric-fuel-pump relay are positioned at the side web plate at the front on the right (near to battery).

Idle throttle-valve switch and angle-of-rotation sensor are positioned on the throttle body (throttle-valve assembly).

Charge-air-pressure timing valve is positioned on the air-filter housing.

Knock sensor is positioned on the cylinder head (near to starting motor).

Self-diagnosis switch and fault lamp are positioned in the on-board instrument panel.

For production reasons:
continued on the following
coordinate.

Trouble-shooting instructions : FOR-5003
BOSCH system : TI-I
Vehicle make : Ford
Basic microcard : FOR-511

TABLE OF CONTENTS

| Contents | Coordinate |
|---|------------|
| Special features, structure, usage, safety and precautionary measures..... | 02 |
| Trouble-shooting chart (customer complaint)..... | 04 |
| Rapid diagnosis chart..... | 05 |
| Test specifications..... | 09 |
| Electrical terminal diagram..... | 10 |
| Installation position of components with notes on removal and installation..... | 11 |

SPECIAL FEATURES

These instructions, valid at the time of publication, apply to the following Ford models:

Escort XR 3 i/Orion 1.6 Injection with CVH engine as of 1.86

- * Ignition distributor with build-on trigger box (TI-I).
- * Trigger box 1 227 022 017 for all vehicle models with Bosch ignition distributor. (Bosch trigger boxes and Lucas trigger boxes may not be exchanged for one another).
- * Ignition coil 0 221 122 031 bzw. ...367 or competitors' product (Femsa, Polmot).
- * The set values given in these brief instructions apply to Bosch products and cannot be used or may be taken only as approximate guides for competitors' products.

USAGE, STRUCTURE

These brief instructions contain essentially vehicle-specific special features and test specifications (set values).

Corresponding to the customer complaint, the trouble-shooting chart leads to various causes/component faults.

Detailed information with regard to trouble-shooting must be taken from the basic instructions via the trouble-shooting chart.

NOTE: Even if reference is made to basic instructions, the set values, terminal assignments and special features in these vehicle-related brief instructions are always binding.

SAFETY AND PRECAUTIONARY MEASURES

Keep people out of danger.
Avoid damage to the engine, trigger box or ignition system.

* ATTENTION!
High-performance ignition system.
Dangerous high and low voltages.

Do not come into contact with parts or terminals which carry voltage; danger, primary and secondary ends.

* When testing compression, disconnect trigger-box plug or firmly apply ignition coil term.4 to ground using auxiliary cable.

NOTE:
Auxiliary cable must be interference-suppressed by at least 2k Ω.
See basic instructions for further precautionary measures.

TROUBLE-SHOOTING CHART

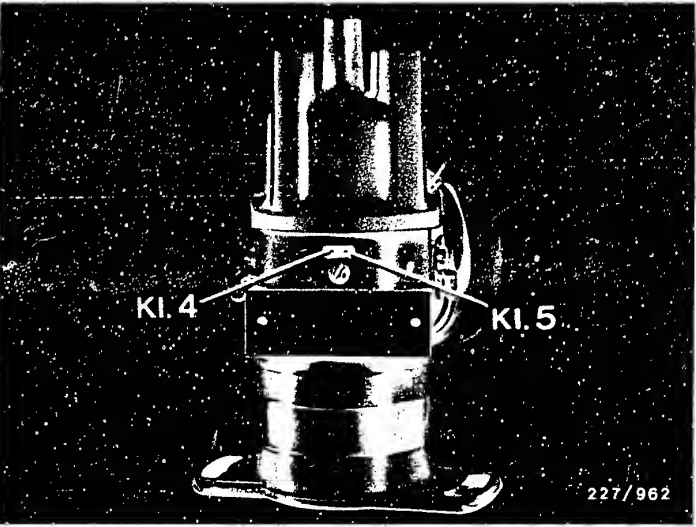
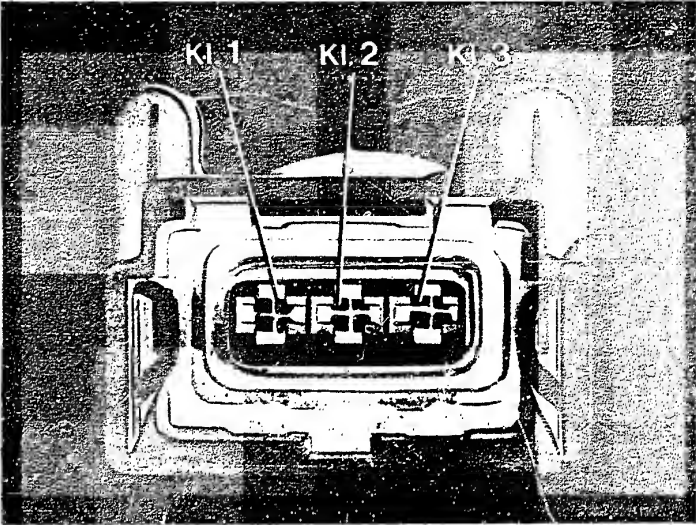
Customer complaint (fault symptoms)

1. Starting motor turns, engine fails to start or starts only with great difficulty.
2. Engine starts but then dies.
3. Uneven engine idle (speed, exhaust).
4. Poor throttle response.
5. Engine misfiring (ignition, fuel management).
6. Engine lacks power/maximum speed too low.
7. Fuel consumption too high.
8. Engine diesels.
9. Engine pings/knocks.
10. Engine becomes too hot.
11. Fault lamp.

| | | | | | | | | | | | Cause (component faults) |
|---|--|---|---|---|---|---|---|---|---|--|--------------------------|
| * | | * | * | * | * | * | | | | | High-voltage end |
| * | | * | * | * | * | | | | | | Ignition coil |
| * | | * | | | | | | | | | Firing sequence |
| * | | | | | | | | | | | Voltage, trigger box |
| * | | | | | | | | | | | Voltage, primary circuit |
| * | | | * | * | | | | | | | Magnetic pulse generator |
| * | | | | | | | | | | | Contact resistances |
| | | * | * | * | * | * | * | * | * | | Ignition point |
| | | | * | | | | | | | | Voltage, trigger box |
| | | | * | | | | | | | | Voltage, ignition coil |
| | | | * | | | | | | | | Primary voltage |
| | | * | * | | * | * | * | * | * | | Centrifugal advance |
| | | * | * | | * | * | * | * | * | | Vacuum advance |
| | | | | | | | * | | | | Fuel quality |

RAPID DIAGNOSIS CHART

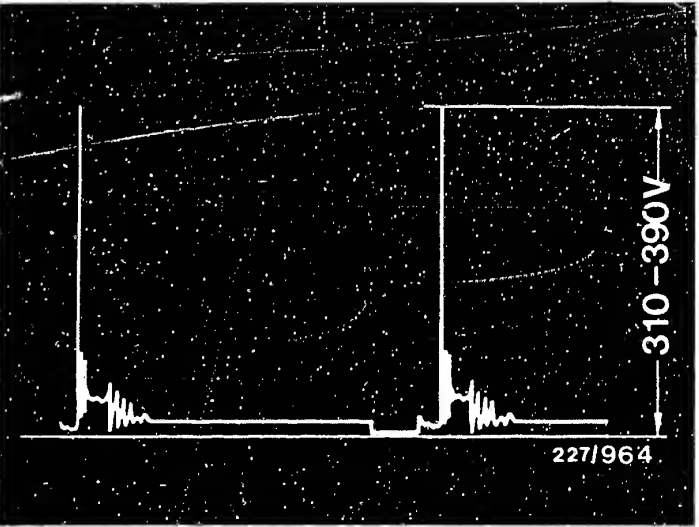
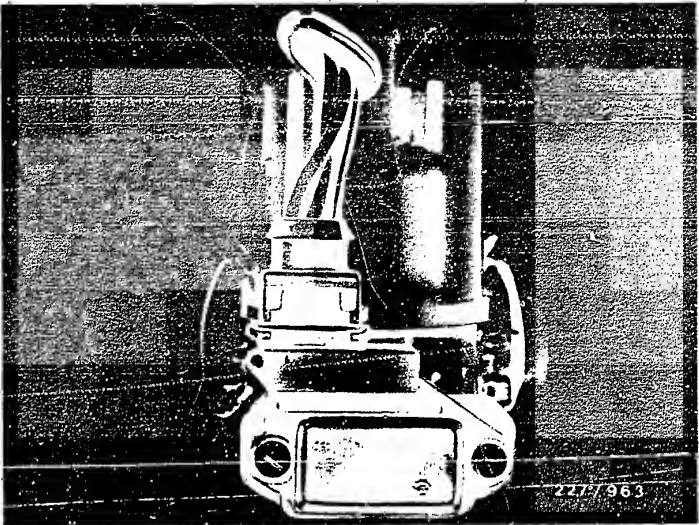
| Test step | Testing of components/function Test instructions/conditions | Terms. | Set values |
|-----------|--|-------------------------------------|--|
| 1 | HIGH-VOLTAGE END, visual examination (distributor cap, ignition harness etc.) Ignition oscillogram | — | — |
| 2 | IGNITION COIL, visual examination, plugs present, sealing compound escaped? Resistance, primary Resistance, secondary | 1 15 1 4 | 0,6...1,1 Ω 4,4...8,7 k Ω |
| 3 | VOLTAGE SUPPLY, TRIGGER BOX Ignition ON. Voltage, trigger box plug | 3 2 + — | approx. U _B |
| 4 | PRIMARY CIRCUIT Ignition ON. Voltage, trigger box plug | 1 2 + — | approx. U _B |
| 5 | MAGNETIC PULSE GENERATOR The ignition distributor must be dismantled from the engine and the trigger box removed for the following tests. 1. Visual examination (mechanical damage), timer core must not brush against generator teeth. 2. Winding resistance, ignition-distributor plug connection. 3. Insulation resistance, ignition-distributor plug connection. | 4 5 4 31 5 31 | 900...1600 Ω infinite Ω |



RAPID DIAGNOSIS CHART (CONTINUED)

| Test step | Testing of components/function Test instructions/conditions | Terms. | Set values |
|-----------|--|--------------|---|
| 6* | CONTACT RESISTANCES Test voltage-supply leads of trigger box and primary circuit for contact resistance. | — | max. 0.3 Ω |
| 7 | IGNITION POINT adjustment. | — | Autodata test values |
| 8 | VOLTAGE SUPPLY, TRIGGER BOX Engine on idle. Voltage, box plug | 3 2 + - | 12...14 V, max. 1 V below U _B |
| 9 | VOLTAGE SUPPLY, IGNITION COIL Engine idle. Voltage, ignition coil and vehicle ground (use adapter for ignition coil). | 15 31 + - | min. 10 V |
| 10 | OUTPUT STAGE Ignition ON. Voltage, ignition coil | 15 1 + - | 0 V |
| 11 | PRIMARY VOLTAGE Voltage, ignition coil at engine idle | 15 1 + - | 310...390 V |

* = Perform only when engine not running.



TEST SPECIFICATIONS

Ignition coil, primary 0,6...1,1 Ω
 Ignition coil, secondary 4,4...8,7 k Ω

Voltage supply
 trigger box at
 engine idle 12...14 V

Voltage supply
 ignition coil at engine idle min. 10 V

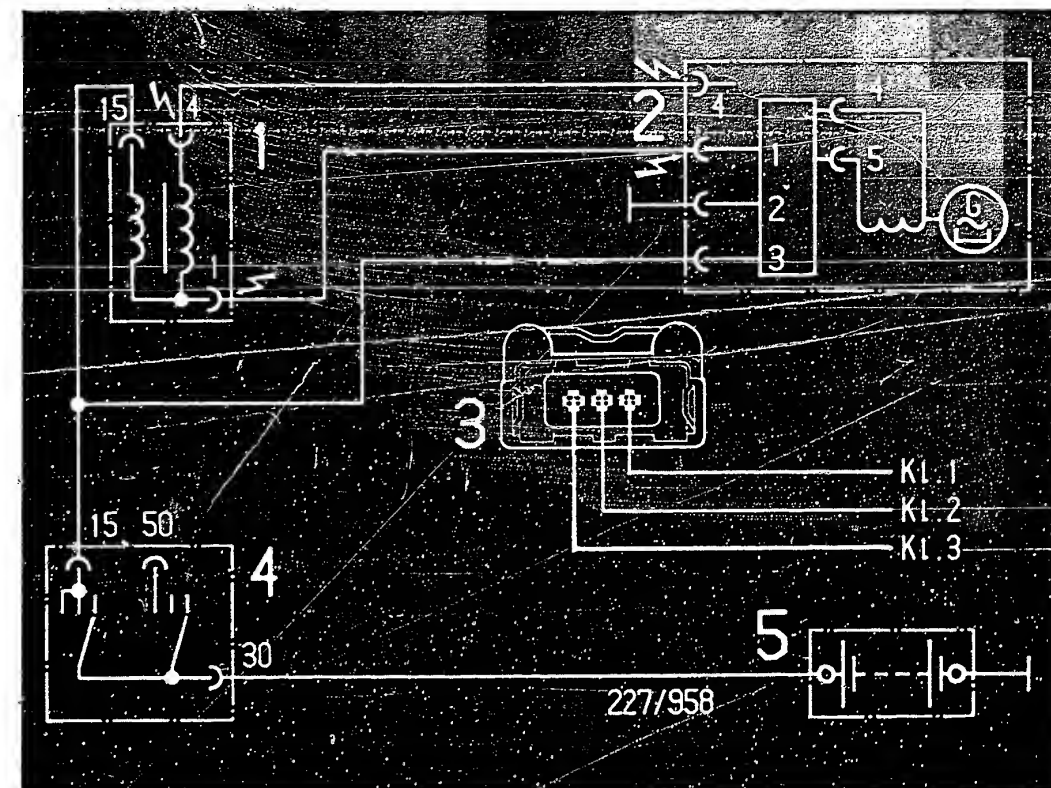
Primary voltage
 at engine idle 310...390 V

Magnetic pulse generator

Insulation infinite Ω

Internal resistance 900...1600 k Ω

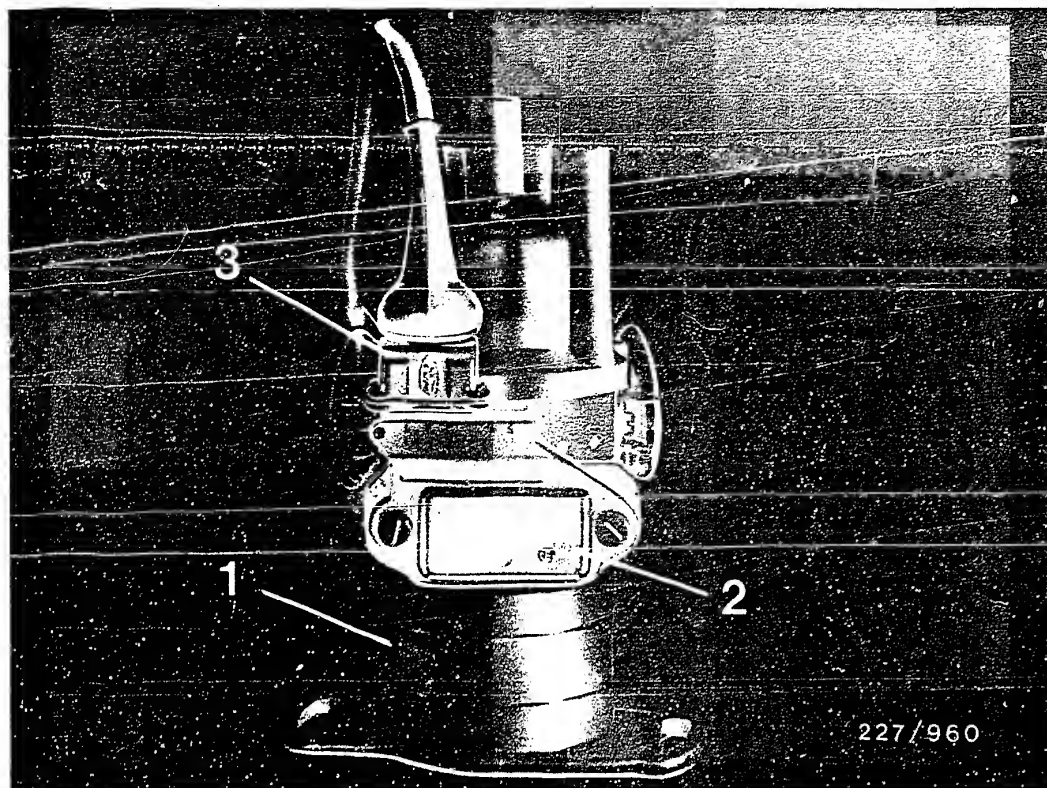
See Autodata test specifications for settings
 for ignition, idle speed, CO concentration etc.



High-voltage symbols= dangerous voltages
 (400 V...25 kV)

- 1 = Ignition coil
- 2 = Ignition distributor with trigger box
- 3 = Trigger-box plug
- 4 = Ignition and starting switch
- 5 = Battery

ELECTRICAL TERMINAL DIAGRAM



- 1 = Ignition distributor
- 2 = Trigger box
- 3 = Three-pin connector

For production reasons:
continued on the following
coordinate.

INSTALLATION POSITION OF COMPONENTS

To remove the trigger box, the ignition distributor must be removed from the engine.

After reinstallation, set ignition point, see Autodata test specifications.

The ignition coil is positioned on the left, as seen from forward direction of travel, next to the suspension-strut tower.

TABLE OF CONTENTS

Trouble-shooting instructions : MB-5028
 BOSCH system : KE 3.1 - Jetronic
 Vehicle make : MERCEDES-BENZ
 Basic microcard : PKW-014

| Test instructions | Coordinates |
|---|-------------|
| Special features..... | 02 |
| Self-diagnosis/Rapid diagnosis chart..... | 09 - 20 |
| Test specifications..... | 03 - 08 |
| Electrical terminal diagram..... | 21 - 24 |
| Electrical wiring diagram..... | |
| Hydraulic-lines diagram..... | |
| Diagram of air/fuel lines..... | 25 |
| Tools and test equipment..... | |
| Testing and adjustment instructions..... | |
| Installation position of components..... | 26 - 28 |
| Notes on removal and installation..... | |
| General important information..... | |

Tests without coordinate details are not applicable
 in these trouble-shooting instructions.

SPECIAL FEATURES

* These instructions contain the trouble-shooting instructions, valid at the time of publication, for the following model:

MERCEDES-BENZ

260 E 2,6l/6-Zyl. 09.86->
 190 E 2,62,6l/6-Zyl. 07.87->

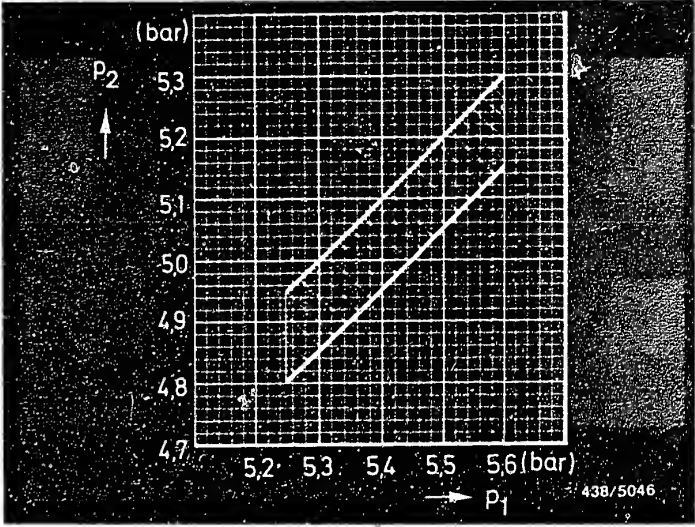
- * Trouble-shooting with theses instructions may only then take place when the details of the "Summary - Service Information for Vehicles" (KFZ-0..) coincide with those of the vehicle type and with the BOSCH number of the KE-Jetronic control unit installed.
- * Control unit using digital techniques, characteristic-map control using microprocessor.
- * Multi-functional fuel-management system with a characteristic map for operation with lambda closed-loop control (CAT) and a characteristic map for operation without lambda closed-loop control (ECE). Activation of the characteristic maps by trimming plug with corresponding marking. To set to the fuel grades unleaded regular and unleaded premium, only the ignition trimming plug must be re-connected.
- * Electronically controlled idle-speed control with single-winding rotary actuator, without bypass adjusting screw.
- * Activated-carbon filter and regeneration valve for return of gasoline vapors into the intake manifold. (Fuel evaporation system)

Important note:

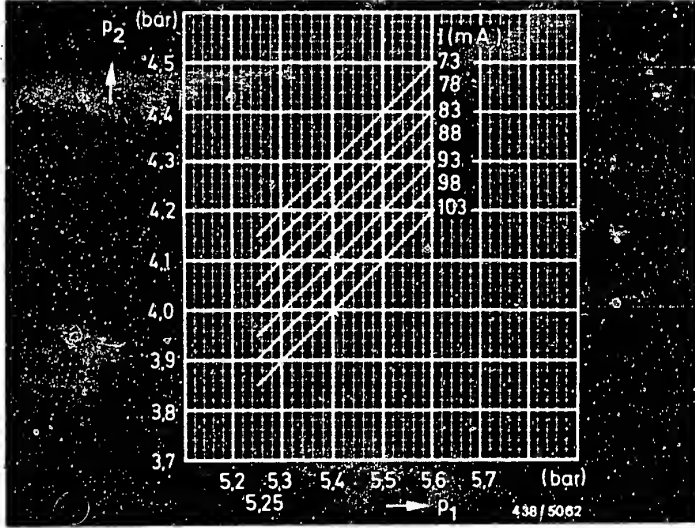
If reference is made to a basic microcard, always make certain you use the test specifications from the vehicle-specific brief instructions.

TEST SPECIFICATIONS

| No. | Testing/Test condition | Test specification | |
|-----|--|--|--|
| 1 | Electric fuel pump - fuel delivery: | At least 1300 cm ³ /min | |
| 2 | Primary pressure: | 5,25...5,6 bar | |
| 3 | Differential pressure: Suppression of peak coil current: Actuate starting motor with fuel-pump relay disconnected. <u>Do not</u> switch off ignition after starting. Take lower-chamber pressure set value "warm" from top chart corresponding to primary pressure measured. (Actuator current 0 mA) Take lower-chamber pressure set value "cold" from bottom chart corresponding to primary pressure measured and actuator current. Tolerance ± 0.15 bar. Simulation of "cold" state: press push-button 3 at test adapter. | | |
| 4 | Leakage test, complete system: Minimum pressure after 10 mins: Minimum pressure after 20 mins: | 2,7 bar 2,6 bar | |
| 5 | Injection valves, opening pressure: | 3,0...4,1 bar | |
| 6 | Fuel deliveries, comparative measurement: (Actuator current 0 mA) Idle: Part load: Full load: Min. delivery at max. air-flow sensor plate defl.: | Setting point: (cm ³ /min) 6,0 40,0 100,0 | Max. permis. delivery: (cm ³ /min) 6,6 42,5 109,0 140 cm ³ /min |



p 1 = Primary pressure
p 2 = Lower-chamber pressure

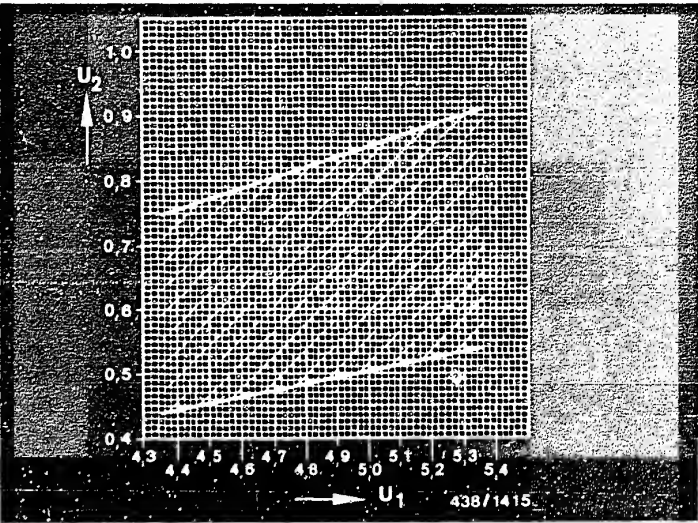


TEST SPECIFICATIONS (CONTINUED)

| No. | Testing/requirements for testing | Test specification |
|-----|--|---|
| 7 | KE-throttle flow-through quantity: | 130...150 cm ³ /min |
| 8 | Air-temperature sensor (NTC I): Air temperature +15...+30°C: | 1,3...3,6 k Ω |
| 9 | Engine-temperature sensor (NTC II): Engine cold (+15...+30°C): Engine warm (approx. +80°C): | 1,3...3,6 k Ω 250...390 Ω |
| 10 | Idle-mixture-adjusting screw - basic adjustment: Fuel-distributor support - needle bearing: | 20,9...21,6 mm |
| 11 | <p>Idle-speed adjustment:</p> <p>Idle-speed regulation: Adjustment of idle air quantity not possible. Engine must be at operating temperature for testing.</p> <p>Idle speed: Shift to driving position, engine speed:</p> <p><u>ECE only</u>: CO concentration in exhaust:</p> <p><u>CAT only</u>: Test lambda closed-loop control: Measurement with lambda closed-loop tester (e.g. KDJE-P 600) and adapter cable (e.g. KDJE-P 600/52) at diagnostic socket (pin 3). Alternative: current measurement with universal test adapter.</p> <p>Render fuel evaporation control system inoperative.</p> <p>Determine the on-off ratio (mean value) at $n = 2500 \text{ min}^{-1}$.</p> <p>Deviation of the on-off ratio (mean value) in idle with respect to $n = 2500 \text{ min}^{-1}$:</p> <p>Adjustment at idle-mixture-adjusting screw. After correction, repeat measurement.</p> | <p>650...750 min⁻¹ 550...650 min⁻¹</p> <p>0,5...1,5 vol. %</p> <p>-10...+10 %</p> |

TEST SPECIFICATIONS (CONTINUED)

| No. | Testing/Test condition | Test specification |
|-----|--|---------------------------------------|
| 12 | <p>Signal, air-flow sensor potentiometer:</p> <p>(Checking necessary when poor idle and/or part-load behavior)</p> <p>Measurement using test adapter and voltmeter.</p> <p>Determine supply voltage of potentiometer: Set value (test adapter, V-position 10):</p> <p>Determine potentiometer signal at idle speed. (Test adapter, V-position 11) Set value corresponding to supply voltage:</p> <p>Adjust signal if necessary at trimming potentiometer (at right next to potentiometer pins).</p> <p>Afterwards, re-secure adjusting screw of trimming potentiometer using black sealing compound (e.g Teroson).</p> | <p>4,35...5,35 V</p> <p>See chart</p> |



U 1 = Supply voltage
potentiometer

U 2 = Potentiometer
voltage signal

SELF-DIAGNOSIS

All Daimler-Benz 4- and 6-cylinder engines in the current series (approx. 10.85) are equipped with self-diagnosis using on-off ratio measurement.

Incorrect input signals from the KE-Jetronic control unit can be displayed with the lambda closed-loop tester at the lambda test output (diagnosis socket, socket 3).

This provides information on short and open circuits. Defects which occur sporadically (e.g. loose contacts) are not indicated. Output of fault signals has priority over output of the lambda closed-loop signal.

We will not go into the defects which can be indicated in more detail here, since the input signals of the KE-Jetronic control unit can be tested with the universal test adapter (rapid-diagnosis chart).

However, if when testing the lambda closed-loop control by means of on-off ratio measurement, a constant on-off ratio is indicated, then the input signals of the KE-Jetronic control unit should be tested (rapid diagnosis chart).

RAPID DIAGNOSIS CHART TO UNIVERSAL TEST ADAPTER ETT 018.01 WITH KE3 ADAPTER LEAD 1 684 463 169 AND APPROPRIATE MULTITESTER:

The following rapid diagnosis chart makes it possible for the experienced Jetronic expert to quickly check the electric/electronic peripheral and control-unit functions of the KE-Jetronic, including the lambda closed-loop control.

Important note on the rapid diagnosis chart:

The "Test conditions" column gives information as to in which test steps the control-unit plug must be connected/disconnected. Make absolutely certain that there is no current at the system when connecting or disconnecting, i.e. the ignition must be switched off and the electric safety circuit must not be short circuited.

The "Test connections" column provides information about the leads connected to the respective measuring path, referring to the assignment in the control-unit plug. Possibly necessary trouble-shooting is with regard to these leads.

The "Test specifications" column contains the test specifications for both the version without lambda closed-loop control (ECE, left-hand test-specifications column) and for the version with lambda closed-loop control (CAT, right-hand test-specifications column). Before starting testing, determine which version is being tested. If only one test specification is given, this applies to both versions.

Attention: When carrying out the test, make sure that the trimming plug is in position 1.

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

| No. | Switch/Btn V | Ω | Bt n | Under test | Test pins | Test conditions | Test specifications |
|-----|-----------------|----------|---------|---|--------------|---|---|
| 1 | V | 4 | - | Int. resistance(R_i) pressure actuator | 12-10 | Disconnect control-unit lead plug. | 20...30 Ω |
| 2 | V | 5 | - | Resistor NTC II (engine) | 21- 2 | Engine temperature +15°...+30° C: approx. +80° C: | 1,3...3,6k Ω 250...390 Ω |
| 3 | V | 6 | - | Resistor NTC I (intake air) | 11- 2 | Air temperature in area of NTC I: +15°...+30° C: | 1,3...3,6k Ω |
| 4 | | | | Signal, altitude sensor. | | Connect control unit. Switch on ignition. Voltmeter connection to blue Ω sockets. Signal altitude-dependent: 0 meters (sea level): 500 meters: 1000 meters: 1500 meters: 2000 meters: 3000 meters: | Test step not applicable! |
| 5 | V | 9 | - | Throttle-valve switch, idle | 13- 2 | Switch off ignition. Disconnect control-unit lead plug. Throttle valve closed: open: | 0...10 Ω > 1000 Ω |
| 6 | V | 10 | - | Throttle-valve switch, full load | 5- 2 | Throttle valve closed: fully open: | > 5000 Ω 0...10 Ω |
| 7 | V | 11 | - | Microswitch idle linkage | 24- 2 | Throttle valve closed: open: | 0...10 Ω infinite Ω |
| 8 | V | 12 | - | Ground, control unit | 20- 2 | | 0...10 Ω |
| 9 | V | 13 | - | Ground, pin 7 | 7- 2 | Switch off ignition. Connect control unit. | 0...10 Ω |

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

| No. | Switch/Btn | | | Under test | Test pins | Test conditions | Test specifications | |
|-----|------------|----------|------|---|-----------|---|---|---|
| | V | Ω | Bt n | | | | ECE | CAT |
| 10 | V | 14 | - | Trimming plug, mixture characteristic map | 22- 2 | Disconnect control-unit plug. Disconnect cable connector from air-flow sensor potentiometer and connect socket 1 of the plug (in upper installation position) to engine ground. Trimming-plug position | 1: 50...60 Ω 2: 100...120 Ω 3: 150...190 Ω 4: 230...270 Ω 5: 330...370 Ω 6: 430...470 Ω 7: 570...620 Ω | 900...1050 Ω 1200...1350 Ω 1500...1750 Ω 2000...2400 Ω 3000...3600 Ω 5000...5600 Ω 11000...12000 Ω |
| 11 | V | 15 | - | Transmission switch (aut. transm. only) | 16- 2 | Connect air-flow sensor potentiometer. Selection-lever position P,N: Driving position selected: | 0...10 Ω infinity Ω | |
| 12 | 5 | - | - | TD signal | 25- 2 | Start engine (starting motor): | Voltage undefined | |
| 13 | 6 | - | - | Control-unit supply | 1- 2 | Switch on ignition: | 8...15 V | |
| 14 | 7 | - | - | Idle actuator, supply and continuity | 3- 2 | Switch on ignition: | 8...15 V | |
| 15 | 8 | - | - | Speed signal | 6- 2 | Drive vehicle on vehicle-performance tester or road: | Voltage undefined | |
| 16 | 9 | - | - | Air-conditioner cut-in signal | 19- 2 | Switch off ignition. Connect control unit. Start engine, switch on air conditioner. Temperature regulator = minimum temperature | 8...15 V | |
| 17 | 10 | - | - | Supply, air-flow sensor potentiometer | 18- 2 | Switch on ignition: | 4,35...5,35 V | |

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

| No. | Switch/Btn | | | Under test | Test pins | Test conditions | Test specifications | |
|-----|------------|----------|------|--|-----------|--|---|---|
| | V | Ω | Bt n | | | | ECE | CAT |
| 18 | 11 | - | - | Signal, air-flow sensor potentiometer | 17- 2 | Switch on ignition. Air-flow sensor plate in neutral position: Deflect air-flow sensor plate by hand, continuous voltage rise up to max.: | 0 V 5,35 V | |
| 19 | 13 | - | 1 | Temperature signal from control unit | 9- 2 | Switch on ignition. While actuating btn 1: | 1,5...1,9 V | |
| 20 | 14 | - | - | Consumption signal | 4- 2 | Start engine - idle: With regulation: | Voltage undefined Voltage change | |
| 21 | - | - | - | Peak coil current | 12-12 | Switch on ignition: | ->FD _____ : _____ mA FD 649->: 9...11 mA | ->FD _____ : _____ mA FD 649->: 18...22 mA |
| 22 | - | - | 1 | Warm-up enrichment +20°C | 12-12 | Warm up engine - idle. Current value with btn 1 pressed: | ->FD _____ : _____ mA FD 649->: 14...19 mA | ->FD _____ : _____ mA FD 649->: 2...6 mA |
| 23 | - | 24 | 2 | Actuator current Engine at norm. op. temp. | 12-12 | Eng. at norm. op. temp., idle Current valve with btn 2 pressed: With CAT, oscillating, mean value: | ->FD _____ : _____ mA FD 649->: -4...+7 mA | ->FD _____ : _____ mA FD 649->: -1...+1 mA |
| 24 | - | 21 | 1 | Starting enrichment | 12-12 | So that eng. fails to start: Disconnect speed relay for elec. fuel pump. Short circuit ign. coil term.4 to grnd via resist. of at least 2k Ω (E.g. with sleeve-type suppressor and spark gap) While btn 1 pressed, actuate starting motor. Current rise (max. 1 s.) to: | ->FD _____ : _____ mA FD 649->: 50...80 mA | ->FD _____ : _____ mA FD 649->: 40...70 mA |

FD = Date of manufacture

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

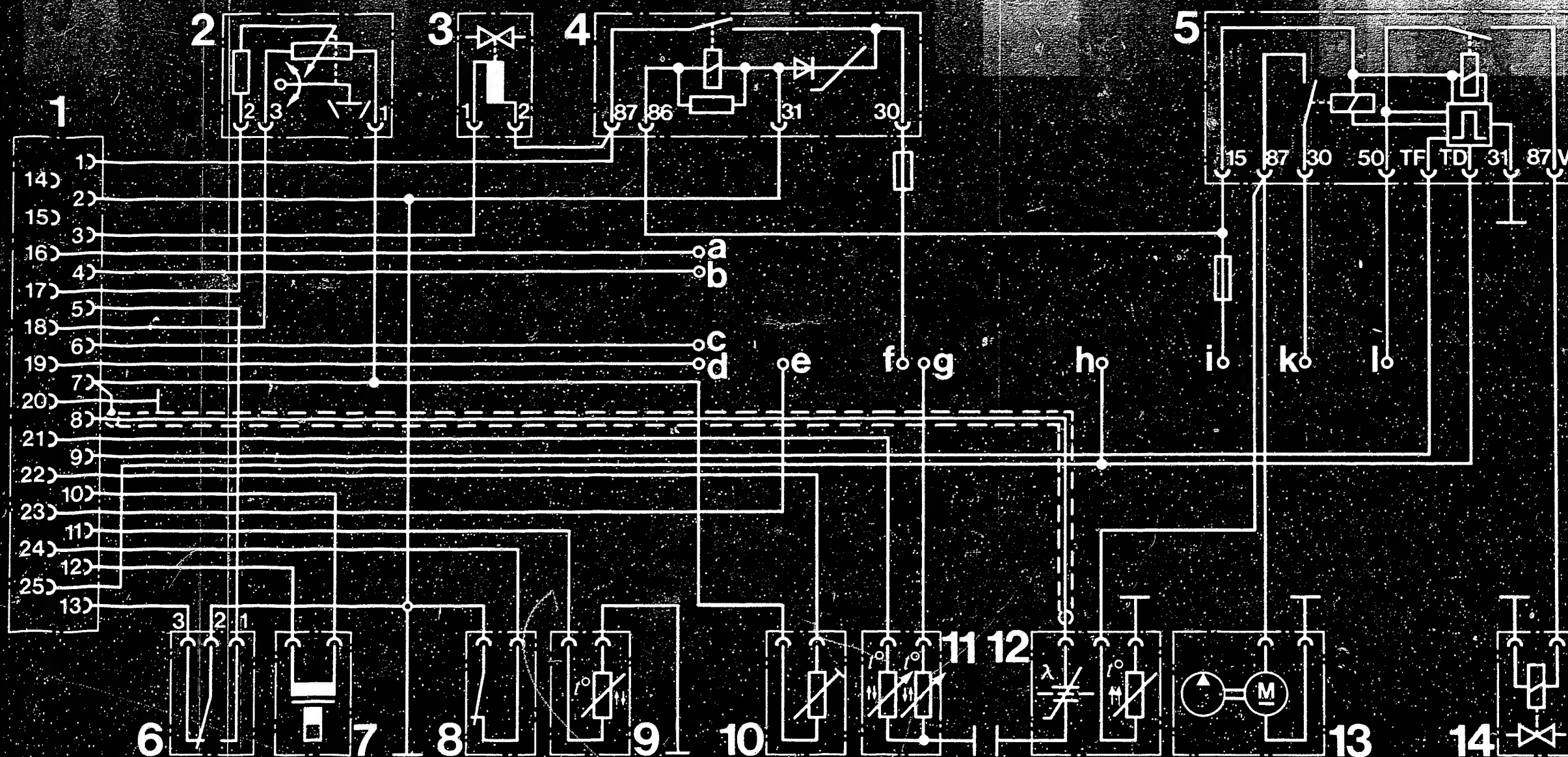
| No. | Switch/ V | Btn. Ω | Bt n. | Subject of testing | Test pins | Test conditions | Test specifications | |
|-----|--------------|------------------|----------|-------------------------|--------------|--|--|--|
| | | | | | | | ECE | CAT |
| 25 | - | 21 | 1 | Post-start enrichment | 12-12 | Start engine (at normal operating temperature) while operating btn. 1. Current value: Current constant for several seconds, then slow decrease to control level. | ->FD _____ : _____ mA FD 649->: 20...26 mA | ->FD _____ : _____ mA FD 649->: 4...8 mA |
| 26 | - | 21 | 1 | Acceleration enrichment | 12-12 | Engine at operating temp., idling. While pressing btn. 1, sharply accelerate engine. Current increase (approx. 1s) to: <u>Note:</u> The level of current depends on the intensity of acceleration (travel/time of sensor-plate movement). | ->FD _____ : _____ mA FD 649->: 30...70 mA | ->FD _____ : _____ mA FD 649->: 25...60 mA |
| 27 | - | - | - | Overrun cut-off | 12-12 | Change connections on ammeter (swap pos. and negative). Run vehicle on chassis dynamometer or road. Increase eng. speed n briefly to at least approx.: Current reading during falling engine-speed phase: (throttle-valve switch idle closed) | ->FD _____ : _____ min ⁻¹ FD 649->: 2500 min ⁻¹ -40...-80 mA | ->FD _____ : _____ min ⁻¹ FD 649->: 2500 min ⁻¹ -40...-80 mA |

FD = Date of manufacture

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

| No. | Switch/Btn. | | | Subject of testing | Test pins | Test conditions | Test specifications | |
|-----|-------------|----------|-------|---|-----------|---|--|--|
| | V | Ω | Bt n. | | | | ECE | CAT |
| 28 | — | 21 | — | Full-load enrichment | 12-12 | <p>Engine at operating temp., idling. Current:</p> <p>Briefly depress accelerator pedal all the way (throttle-valve switch must switch full load). During engine-speed increase, current increase by:</p> <p><u>Important:</u> Keep this step very brief, to prevent the engine speed from rising too much and damaging the engine.</p> | <p>→FD — : — mA FD 649→: -4...+7 mA</p> <p>→FD — : — mA FD 649→: 4...10 mA</p> | <p>→FD — : — mA FD 649→: -2...+2 mA</p> <p>→FD — : — mA FD 649→: 4...10 mA</p> |
| 29 | — | 21 | — | Lambda closed-loop control, open-loop operation | 12-12 | <p>Remove regeneration line to throttle-valve assembly at regeneration valve and seal off.</p> <p>Engine at operating temp. at idle. Current:</p> | — | -2...+2 mA |
| 30 | — | 24 | — | Lambda closed-loop control, closed-loop operation | 12-12 | <p>Engine at operating temp. at idle. Closed-loop operation can be recognized by the oscillating current reading. Mean value:</p> <p>If mean value outside tolerance, set (using idle-mixture-adjusting screw) to:</p> | — — | <p>-1...+1 mA</p> <p>approx. 0 mA</p> |
| 31 | — | 22 | — | Lambda closed-loop control rich stop | 12-12 | Engine at operating temp. at idle. Current rise to: | — | 12...16 mA |
| 32 | — | 23 | — | Lambda closed-loop control lean stop | 12-12 | Engine at operating temp. at idle. Current drop to: | — | -8...-12 mA |

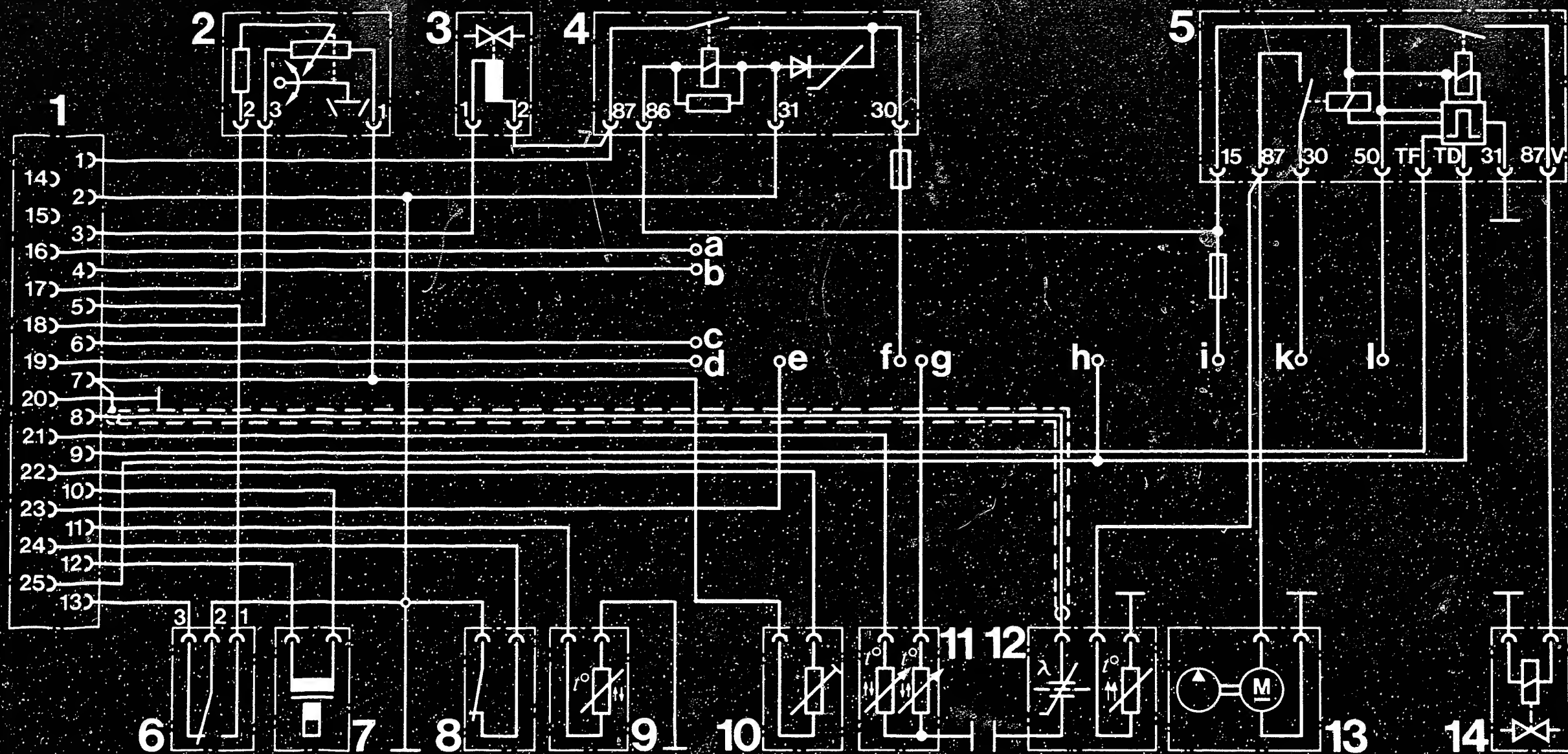
FD = Date of manufacture



- 1 = Control-unit, KE-Jetronic
- 2 = Air-flow sensor potentiometer
- 3 = Idle actuator
- 4 = Over-voltage protection relay
- 5 = Electronic relay for electric fuel pump and cold-start valve actuation
- 6 = Throttle-valve switch, idle/full load

- 7 = Electro-hydraulic pressure actuator
- 8 = Throttle-valve switch, idle/linkage
- 9 = Temperature sensor, intake air (NTC I)
- 10 = Trimming plug, map adjustment
- 11 = Temperature sensor, engine (Double NTC)
- 12 = Heated lambda sensor
- 13 = Electric fuel pump
- 14 = Cold-start valve

ELECTRICAL TERMINAL DIAGRAM WITH ELECTRIC FUEL PUMP SAFETY CIRCUIT



438/1501

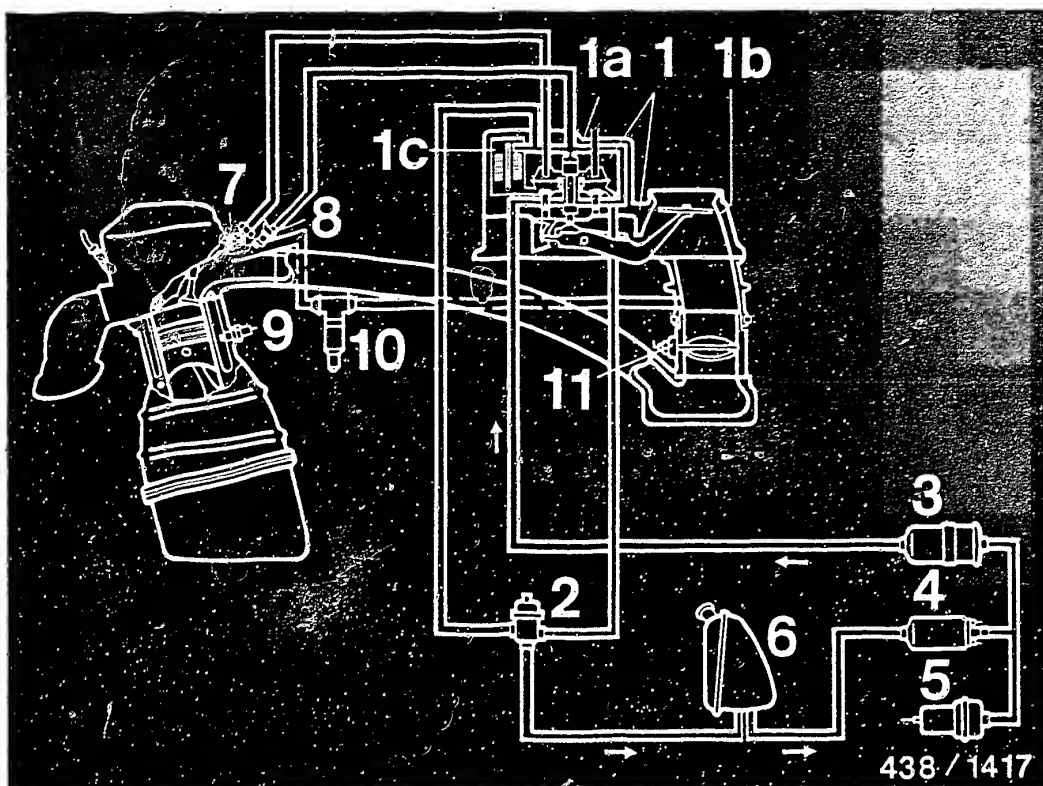
a = Transmission switch (automatic only)
 b = Consumption signal
 c = Speed signal
 d = Connection of control unit, air conditioner
 e = Lambda test output

f = Terminal 30 (B +)
 g = Ignition system (EI-L)
 h = TD signal ignition
 i = Terminal 15
 k = Terminal 30 (B +)
 l = Terminal 15a - Starting motor

ELECTRICAL TERMINAL DIAGRAM WITH ELECTRIC FUEL PUMP SAFETY CIRCUIT

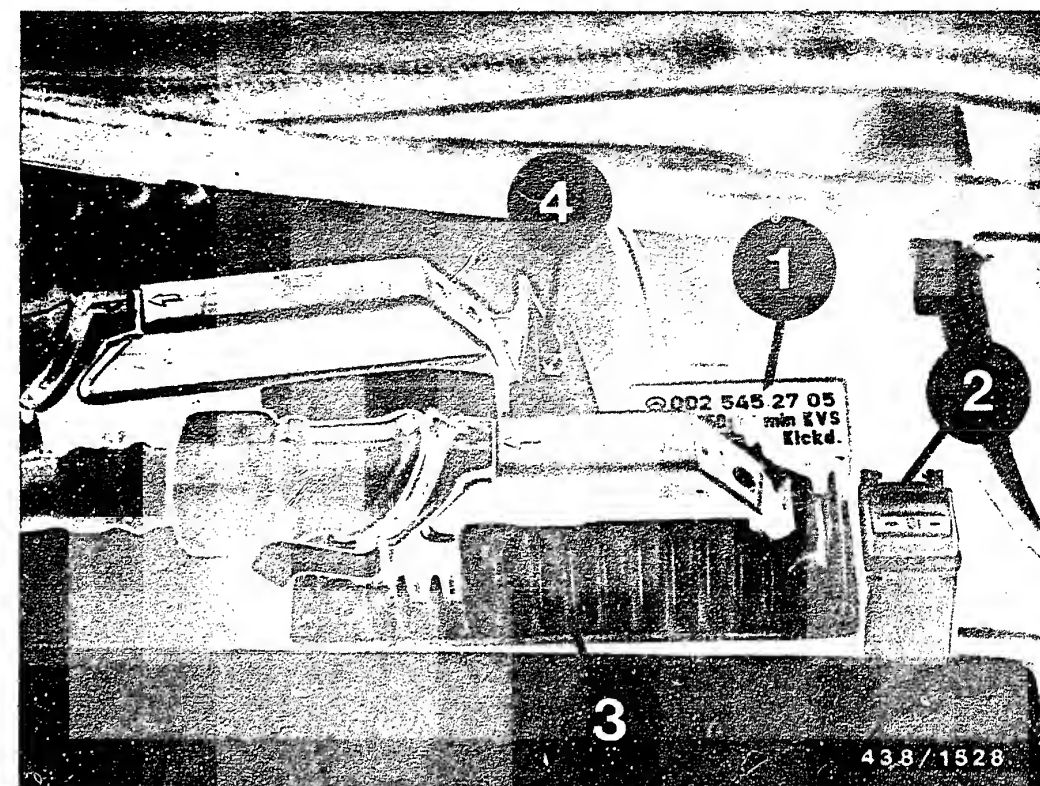
D23

D24



- 1 = Mixture-control unit
- 1a = Fuel distributor
- 1b = Air-flow sensor
- 1c = Electro-hydraulic pressure actuator
- 2 = Pressure regulator, primary pressure
- 3 = Fuel filter
- 4 = Electric fuel pump
- 5 = Fuel accumulator
- 6 = Fuel tank
- 7 = Injection valve
- 8 = Cold-start valve
- 9 = Temperature sensor engine (Double NTC)
- 10 = Idle actuator
- 11 = Throttle-valve switch, idle/full load

DIAGRAM OF AIR AND FUEL LINES

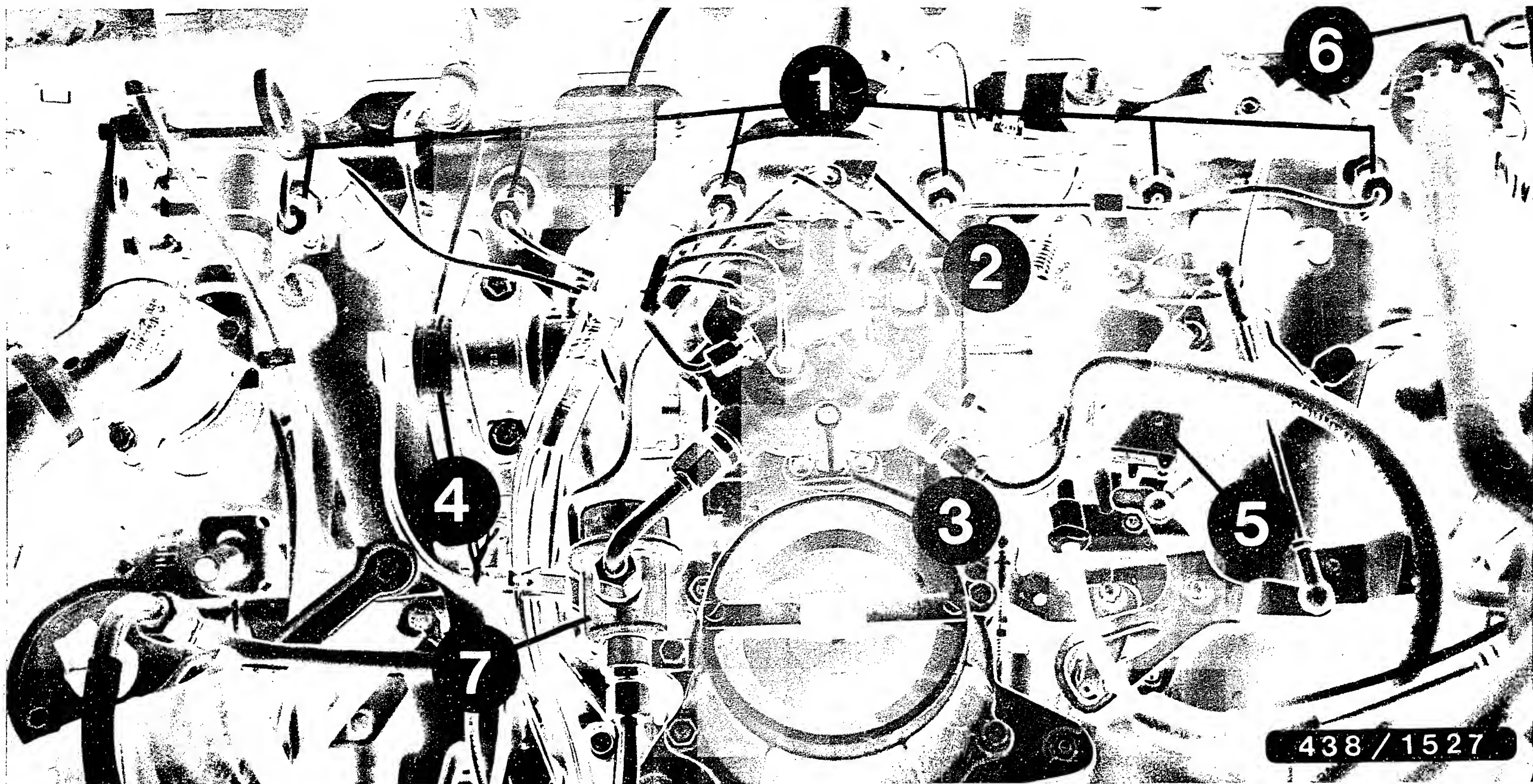


- 1 = Electronic relay for electric-fuel-pump and cold-start valve actuation
- 2 = Over-voltage protection relay
- 3 = KE-Jetronic control unit
- 4 = ABS controller (if present)

In Type 126, the electric fuel pump relay and the over-voltage protection relay are positioned in the engine compartment on the left.

The KE-Jetronic control unit and the mixture map trimming plug are installed in the footwell on the right behind the side panel in the Type 126.

INSTALLATION POSITION OF COMPONENTS



1 = Fuel-injection valves
 2 = Start valve
 3 = Mixture-control unit
 4 = Idle actuator

5 = Throttle-valve switch, idle
 (microswitch on accelerator linkage)
 6 = Engine-temperature sensor (concealed)
 7 = Pressure regulator

INSTALLATION POSITION OF COMPONENTS

TABLE OF CONTENTS

Trouble-shooting instructions : MB-5029

BOSCH system : KE 3.1 - Jetronic

Vehicle make : MERCEDES-BENZ

Basic microcard : PKW-014

| Test instructions | Coordinates |
|---|-------------|
| Special features..... | 02 |
| Self-diagnosis/Rapid diagnosis chart..... | 09 - 20 |
| Test specifications..... | 03 - 08 |
| Electrical terminal diagram..... | 21 - 24 |
| Electrical wiring diagram..... | |
| Hydraulic-lines diagram..... | |
| Diagram of air/fuel lines..... | 25 |
| Tools and test equipment..... | |
| Testing and adjustment instructions..... | |
| Installation position of components..... | 26 - 28 |
| Notes on removal and installation..... | |
| General important information..... | |

Tests without coordinate details are not applicable in these trouble-shooting instructions.

SPECIAL FEATURES

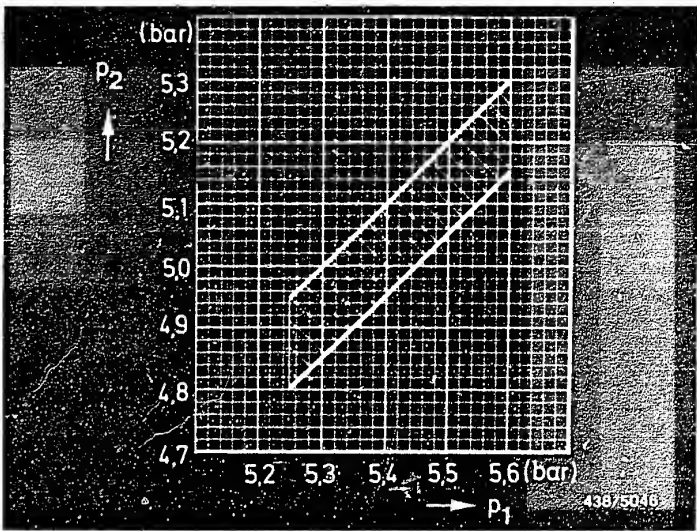
- * These instructions contain the trouble-shooting instructions, valid at the time of publication, for the following model:

MERCEDES-BENZ
300 E, TE, SE, SEL, 3,0l/6Zyl. 03.86->
- * Trouble-shooting with theses instructions may only then take place when the details of the "Summary - Service Information for Vehicles" (KFZ-0..) coincide with those of the vehicle type and with the BOSCH number of the KE-Jetronic control unit installed.
- * Control unit using digital techniques, characteristic-map control using microprocessor.
- * Multi-functional fuel-management system with a characteristic map for operation with lambda closed-loop control (CAT) and a characteristic map for operation without lambda closed-loop control (ECE).
Activation of the characteristic maps by trimming plug with corresponding marking.
To set to the fuel grades unleaded regular and unleaded premium, only the ignition trimming plug must be re-connected.
- * Electronically controlled idle-speed control with single-winding rotary actuator, without bypass adjusting screw.
- * Activated-carbon filter and regeneration valve for return of gasoline vapors into the intake manifold. (Fuel evaporation system)

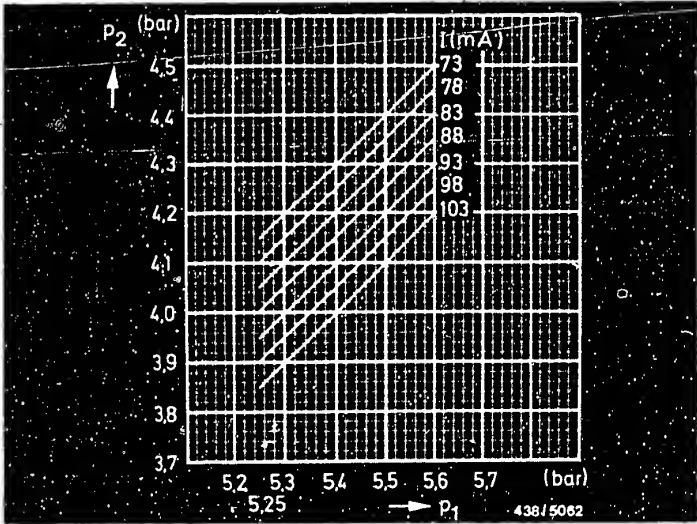
Important note:
If reference is made to a basic microcard, always make certain you use the test specifications from the vehicle-specific brief instructions.

TEST SPECIFICATIONS

| No. | Testing/Test condition | Test specification | |
|-----|--|--|--|
| 1 | Electric fuel pump – fuel delivery: | At least 1400 cm ³ /min | |
| 2 | Primary pressure: | 5,25...5,6 bar | |
| 3 | Differential pressure: Suppression of peak coil current: Actuate starting motor with fuel-pump relay disconnected. <u>Do not</u> switch off ignition after starting. Take lower-chamber pressure set value "warm" from top chart corresponding to primary pressure measured. (Actuator current 0 mA) Take lower-chamber pressure set value "cold" from bottom chart corresponding to primary pressure measured and actuator current. Tolerance ± 0.15 bar. Simulation of "cold" state: press push-button 3 at test adapter. | | |
| 4 | Leakage test, complete system: Minimum pressure after 10 mins: Minimum pressure after 20 mins: | 2,7 bar 2,6 bar | |
| 5 | Injection valves, opening pressure: | 3,0...4,1 bar | |
| 6 | Fuel deliveries, comparative measurement: (Actuator current 0 mA) Idle: Part load: Full load: Min. delivery at max. air-flow sensor plate defl.: | Setting point: (cm ³ /min) 6,0 40,0 100,0 | Max. permis. delivery: (cm ³ /min) 6,6 42,5 109,0 |
| | | 140 cm ³ /min | |



p 1 = Primary pressure
p 2 = Lower-chamber pressure

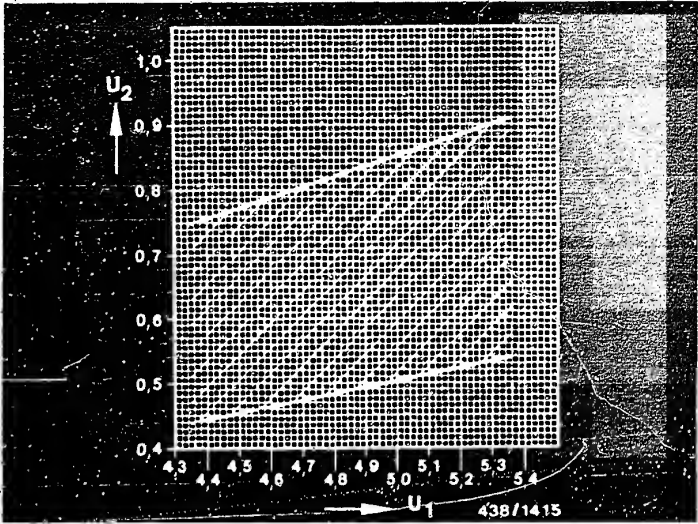


TEST SPECIFICATIONS (CONTINUED)

| No. | Testing/requirements for testing | Test specification |
|-----|--|--|
| 7 | KE-throttle flow-through quantity: | 130...150 cm ³ /min |
| 8 | Air-temperature sensor (NTC I): Air temperature +15...+30°C: | 1,3...3,6 k Ω |
| 9 | Engine-temperature sensor (NTC II): Engine cold (+15...+30°C): Engine warm (approx. +80°C): | 1,3...3,6 k Ω 250...390 Ω |
| 10 | Idle-mixture-adjusting screw - basic adjustment: Fuel-distributor support - needle bearing: | 20,9...21,6 mm |
| 11 | <p>Idle-speed adjustment:</p> <p>Idle-speed regulation: Adjustment of idle air quantity not possible. Engine must be at operating temperature for testing.</p> <p>Idle speed: Shift to driving position, engine speed:</p> <p><u>ECE only</u>: CO concentration in exhaust:</p> <p><u>CAT only</u>: Test lambda closed-loop control: Measurement with lambda closed-loop tester (e.g. KDJE-P 600) and adapter cable (e.g. KDJE-P 600/52) at diagnostic socket (pin 3). Alternative: current measurement with universal test adapter.</p> <p>Render fuel evaporation control system inoperative.</p> <p>Determine the on-off ratio (mean value) at $n = 2500 \text{ min}^{-1}$.</p> <p>Deviation of the on-off ratio (mean value) in idle with respect to $n = 2500 \text{ min}^{-1}$:</p> <p>Adjustment at idle-mixture-adjusting screw. After correction, repeat measurement.</p> | <p>620...720 min⁻¹ 500...600 min⁻¹ 0,5...1,5 vol. %</p> <p>-10...+10 %</p> |

TEST SPECIFICATIONS (CONTINUED)

| No. | Testing/Test condition | Test specification |
|-----|--|---------------------------------------|
| 12 | <p>Signal, air-flow sensor potentiometer:</p> <p>(Checking necessary when poor idle and/or part-load behavior)</p> <p>Measurement using test adapter and voltmeter.</p> <p>Determine supply voltage of potentiometer: Set value (test adapter, V-position 10):</p> <p>Determine potentiometer signal at idle speed. (Test adapter, V-position 11) Set value corresponding to supply voltage:</p> <p>Adjust signal if necessary at trimming potentiometer (at right next to potentiometer pins).</p> <p>Afterwards, re-secure adjusting screw of trimming potentiometer using black sealing compound (e.g Teroson).</p> | <p>4,35...5,35 V</p> <p>See chart</p> |



U 1 = Supply voltage
potentiometer

U 2 = Potentiometer
voltage signal

SELF-DIAGNOSIS

All Daimler-Benz 4- and 6-cylinder engines in the current series (approx. 10.85) are equipped with self-diagnosis using on-off ratio measurement.

Incorrect input signals from the KE-Jetronic control unit can be displayed with the lambda closed-loop tester at the lambda test output (diagnosis socket, socket 3).

This provides information on short and open circuits. Defects which occur sporadically (e.g. loose contacts) are not indicated. Output of fault signals has priority over output of the lambda closed-loop signal.

We will not go into the defects which can be indicated in more detail here, since the input signals of the KE-Jetronic control unit can be tested with the universal test adapter (rapid-diagnosis chart).

However, if when testing the lambda closed-loop control by means of on-off ratio measurement, a constant on-off ratio is indicated, then the input signals of the KE-Jetronic control unit should be tested (rapid diagnosis chart).

RAPID DIAGNOSIS CHART TO UNIVERSAL TEST ADAPTER ETT 018.01 WITH KE3 ADAPTER LEAD 1 684 463 169 AND APPROPRIATE MULTITESTER:

The following rapid diagnosis chart makes it possible for the experienced Jetronic expert to quickly check the electric/electronic peripheral and control-unit functions of the KE-Jetronic, including the lambda closed-loop control.

Important note on the rapid diagnosis chart:

The "Test conditions" column gives information as to in which test steps the control-unit plug must be connected/disconnected. Make absolutely certain that there is no current at the system when connecting or disconnecting, i.e. the ignition must be switched off and the electric safety circuit must not be short circuited.

The "Test connections" column provides information about the leads connected to the respective measuring path, referring to the assignment in the control-unit plug. Possibly necessary trouble-shooting is with regard to these leads.

The "Test specifications" column contains the test specifications for both the version without lambda closed-loop control (ECE, left-hand test-specifications column) and for the version with lambda closed-loop control (CAT, right-hand test-specifications column).

Before starting testing, determine which version is being tested. If only one test specification is given, this applies to both versions.

Attention: When carrying out the test, make sure that the trimming plug is in position 1.

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

| No. | Switch/Btn V | Ω | Bt n | Under test | Test pins | Test conditions | Test specifications |
|-----|-----------------|----------|---------|---|--------------|--|---|
| 1 | V | 4 | - | Int. resistance(R_1) pressure actuator | 12-10 | Disconnect control-unit lead plug. | 20...30 Ω |
| 2 | V | 5 | - | Resistor NTC II (engine) | 21- 2 | Engine temperature +15°...+30° C: approx. +80° C: | 1,3...3,6k Ω 250...390 Ω |
| 3 | V | 6 | - | Resistor NTC I (intake air) | 11- 2 | Air temperature in area of NTC I: +15°...+30° C: | 1,3...3,6k Ω |
| 4 | | | | Signal, altitude sensor | | Connect control unit. Switch on ignition. Voltmeter connection to blue Ω sockets. Signal altitude-dependent: 0 meters (sea level): 500 meters: 1000 meters: 1500 meters: 2000 meters: 3000 meters: | Test step not applicable! |
| 5 | V | 9 | - | Throttle-valve switch, idle | 13- 2 | Switch off ignition. Disconnect control-unit lead plug. Throttle valve closed: open: | 0...10 Ω > 1000 Ω |
| 6 | V | 10 | - | Throttle-valve switch, full load | 5- 2 | Throttle valve closed: fully open: | > 10000 Ω 0...10 Ω |
| 7 | V | 11 | - | Microswitch idle linkage | 24- 2 | Throttle valve closed: open: | 0...10 Ω infinite Ω |
| 8 | V | 12 | - | Ground, control unit | 20- 2 | | 0...10 Ω |
| 9 | V | 13 | - | Ground, pin 7 | 7- 2 | Switch off ignition. Connect control unit. | 0...10 Ω |

RAPID DAIGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

| No. | Switch/Btn | | | Under test | Test pins | Test conditions | Test specifications | |
|-----|------------|----------|------|---|-----------|---|---------------------|---|
| | V | Ω | Bt n | | | | ECE | CAT |
| 10 | V | 14 | - | Trimming plug mixture map | 22- 2 | Disconnect control-unit lead plug. Disconnect lead plug from air-flow sensor potentiometer and connect socket 1 of plug (in upper installation position) with engine ground. Trimming-plug position | | |
| | | | | | | 1: 50...60 Ω 2: 100...120 Ω 3: 150...190 Ω 4: 230...270 Ω 5: 330...370 Ω 6: 430...470 Ω 7: 570...620 Ω | | 900...1050 Ω 1200...1350 Ω 1500...1750 Ω 2000...2400 Ω 3000...3600 Ω 5000...5600 Ω 11000...12000 Ω |
| 11 | V | 15 | - | Transmission switch (only automatic transmission) | 16- 2 | Connect air-flow sensor potentiometer. Selection lever in position P, N: Driving position selected: | | 0...10 Ω Infinite Ω |
| 12 | 5 | - | - | TD signal | 25- 2 | Start engine (starting motor): | Voltage undefined | |
| 13 | 6 | - | - | Control-unit supply | 1- 2 | Switch on ignition: | 8...15 V | |
| 14 | 7 | - | - | Idle actuator supply and continuity | 3- 2 | Switch on ignition: | 8...15 V | |
| 15 | 8 | - | - | Tempomat signal | 6- 2 | Switch Tempomat operation: | — V | |
| 16 | 9 | - | - | Air-conditioner cut-in signal | 19- 2 | Connect control unit. Start engine, switch on air conditioner. Temperature regulator = minimum temperature: | 8...15 V | |
| 17 | 10 | - | - | Supply, air-flow sensor potentiometer | 18- 2 | Switch on ignition: | 4,35...5,35 V | |

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

| No. | Switch/Btn | | | Under test | Test pins | Test conditions | Test specifications | |
|-----|------------|----------|------|---|-----------|---|---------------------------------------|---------------------------------------|
| | V | Ω | Bt n | | | | ECE | CAT |
| 18 | 11 | — | — | Signal, air-flow sensor potentiometer | 17- 2 | Switch on ignition. Air-flow sensor plate in neutral position: Deflect air-flow sensor plate by hand, continuous voltage rise up to max.: | 0 V 5,35 V | |
| 19 | 13 | — | 1 | Temperature signal from control unit | 9- 2 | Switch on ignition. While actuating btn 1: | 1,5...1,9 V | |
| 20 | 14 | — | — | Consumption signal | 4- 2 | Start engine - idle: With regulation: | Voltage undefined Voltage change | |
| 21 | — | — | — | Peak coil current | 12-12 | Switch on ignition: | ->FD — : — mA FD 642->: 9...11 mA | ->FD — : — mA FD 642->: 18...22 mA |
| 22 | — | — | 1 | Warm-up enrichment +20°C | 12-12 | Warm up engine - idle. Current value with btn 1 pressed: | ->FD — : — mA FD 642->: 11...17 mA | ->FD — : — mA FD 642->: 2...5 mA |
| 23 | — | 24 | 2 | Actuator current Engine at norm. op. temp. | 12-12 | Eng. at norm. op. temp., idle Current valve with btn 2 pressed: With CAT, oscillating, mean value: | ->FD — : — mA FD 642->: -4...+7 mA | ->FD — : — mA FD 642->: -1...+1 mA |
| 24 | — | 21 | 1 | Starting enrichment | 12-12 | So that eng. fails to start: Disconnect speed relay for elec. fuel pump. Short circuit ign. coil term.4 to grnd via resist. of at least 2k Ω (E.g. with sleeve-type suppressor and spark gap) While btn 1 pressed, actuate starting motor. Current rise (max. 1 s.) to: | ->FD — : — mA FD 642->: 60...80 mA | ->FD — : — mA FD 642->: 50...70 mA |

FD = Date of manufacture

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

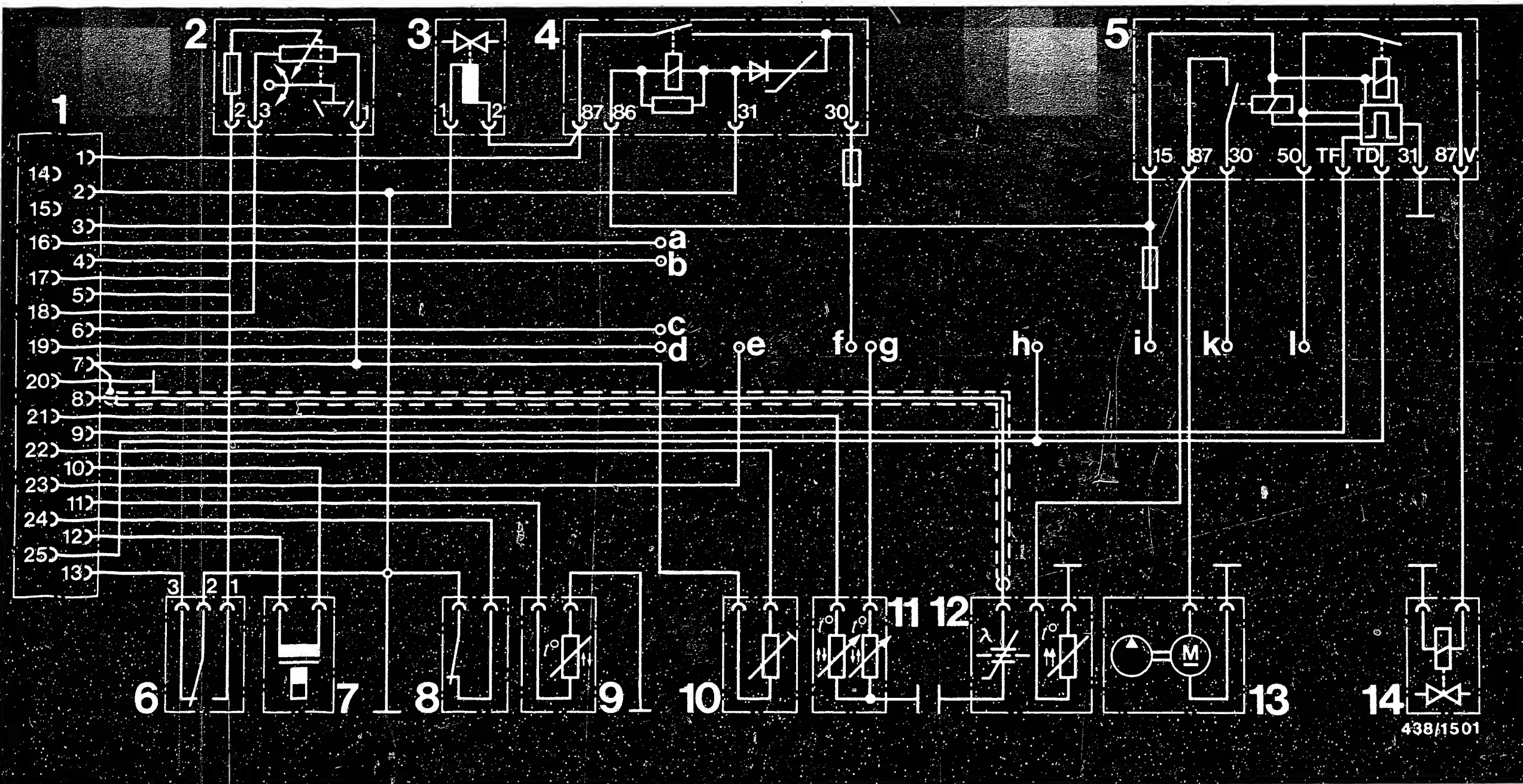
| No. | Switch/ V | Btn. Ω | Subject of testing | Test pins | Test conditions | Test specifications | |
|-----|--------------|------------------|--------------------|-----------|--|--|--|
| | | | | | | ECE | CAT |
| 25 | — | 21 | 1 | 12-12 | Start engine (at normal operating temperature) while operating btn. 1. Current value: Current constant for several seconds, then slow decrease to control level. | ->FD — : — mA FD 642->: 15...25 mA | ->FD — : — mA FD 642->: 4...8 mA |
| 26 | — | 21 | 1 | 12-12 | Engine at operating temp., idling. While pressing btn. 1, sharply accelerate engine. Current increase (approx. 1s) to: <u>Note:</u> The level of current depends on the intensity of acceleration (travel/time of sensor-plate movement). | ->FD — : — mA FD 642->: 40...60 mA | ->FD — : — mA FD 642->: 40...60 mA |
| 27 | — | — | — | 12-12 | Change connections on ammeter (swap pos. and negative). Run vehicle on chassis dynamometer or road. Increase eng. speed n briefly to at least approx.: Current reading during falling engine-speed phase: (throttle-valve switch idle closed) | ->FD — : — min ⁻¹ FD 642->: 2500 min ⁻¹ -40...-80 mA | ->FD — : — min ⁻¹ FD 642->: 2500 min ⁻¹ -40...-80 mA |

FD = Date of manufacture

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

| No. | Switch/Btn. | | | Subject of testing | Test pins | Test conditions | Test specifications | |
|-----|-------------|----------|-------|---|-----------|--|---|---|
| | V | Ω | Bt n. | | | | ECE | CAT |
| 28 | — | 21 | — | Full-load enrichment | 12-12 | <p>Engine at operating temp., idling. Current:</p> <p>Briefly depress accelerator pedal all the way (throttle-valve switch must switch full load).</p> <p>During engine-speed increase, current increase by:</p> <p><u>Important:</u> Keep this step very brief, to prevent the engine speed from rising too much and damaging the engine.</p> | <p>->FD — : — mA FD 642->: -4...+7 mA</p> <p>->FD — : — mA FD 642->: 3...8 mA</p> | <p>->FD — : — mA FD 642->: -2...+2 mA</p> <p>->FD — : — mA FD 642->: 4...9 mA</p> |
| 29 | — | 21 | — | Lambda closed-loop control, open-loop operation | 12-12 | <p>Remove regeneration line to throttle-valve assembly at regeneration valve and seal off.</p> <p>Engine at operating temp. at idle. Current:</p> | — | -2...+2 mA |
| 30 | — | 24 | — | Lambda closed-loop control, closed-loop operation | 12-12 | <p>Engine at operating temp. at idle. Closed-loop operation can be recognized by the oscillating current reading. Mean value:</p> <p>If mean value outside tolerance, set (using idle-mixture-adjusting screw) to:</p> | — — | <p>-1...+1 mA</p> <p>approx. 0 mA</p> |
| 31 | — | 22 | — | Lambda closed-loop control rich stop | 12-12 | Engine at operating temp. at idle. Current rise to: | — | 12...16 mA |
| 32 | — | 23 | — | Lambda closed-loop control lean stop | 12-12 | Engine at operating temp. at idle. Current drop to: | — | -8...-12 mA |

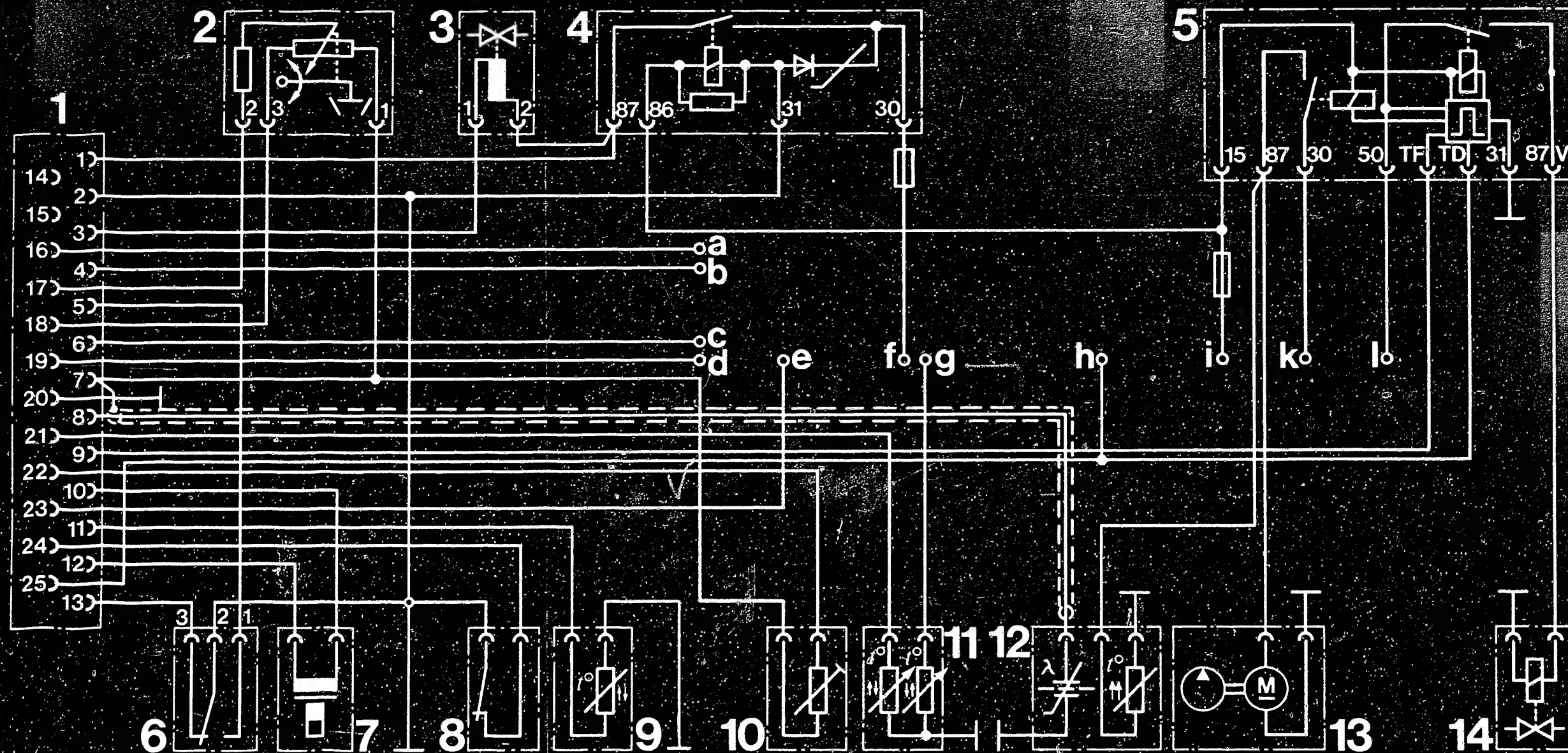
FD = Date of manufacture



- 1 = Control-unit, KE-Jetronic
- 2 = Air-flow sensor potentiometer
- 3 = Idle actuator
- 4 = Over-voltage protection relay
- 5 = Electronic relay for electric fuel pump and cold-start valve actuation
- 6 = Throttle-valve switch, idle/full load

- 7 = Electro-hydraulic pressure actuator
- 8 = Throttle-valve switch, idle/linkage
- 9 = Temperature sensor, intake air (NTC I)
- 10 = Trimming plug, map adjustment
- 11 = Temperature sensor, engine (Double NTC)
- 12 = Heated lambda sensor
- 13 = Electric fuel pump
- 14 = Cold-start valve

ELECTRICAL TERMINAL DIAGRAM WITH ELECTRIC FUEL PUMP SAFETY CIRCUIT

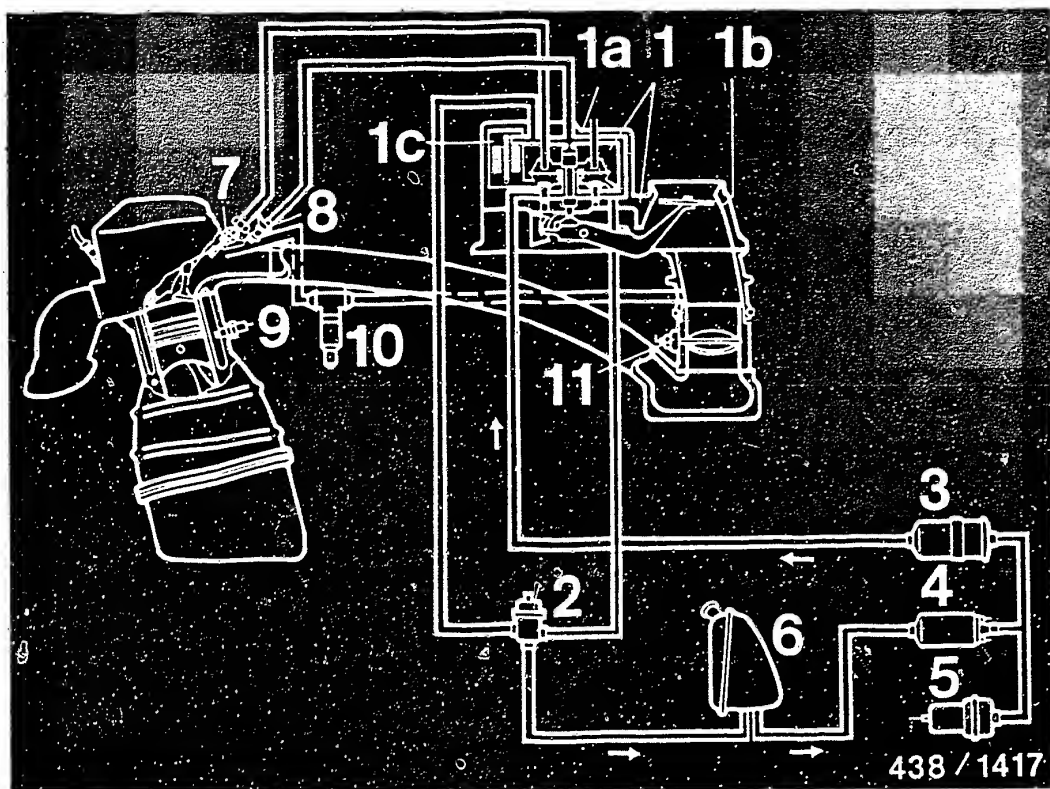


438/1501

a = Transmission switch (automatic only)
 b = Consumption signal
 c = Connection of Tempomat operating element
 d = Connection of air-conditioner control unit
 e = Lambda test output

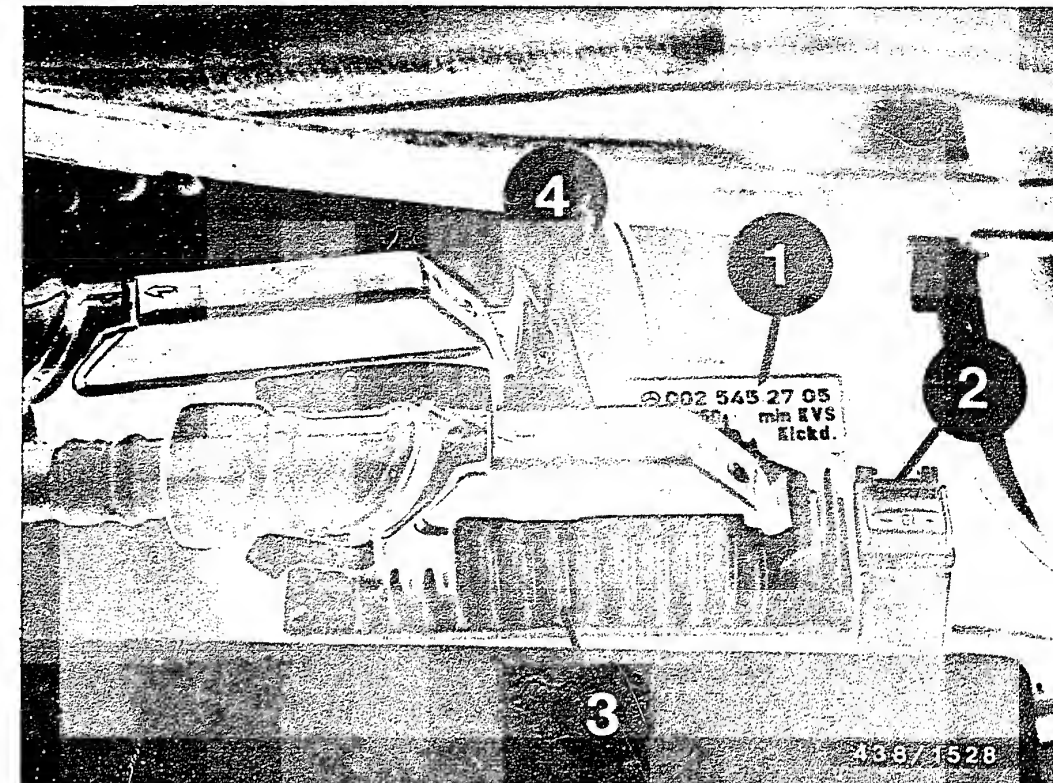
f = Terminal 30 (B +)
 g = Ignition system (EZ-L)
 h = TD signal, ignition
 i = Terminal 15
 k = Terminal 30 (B +)
 l = Terminal 15a - starting motor

Electrical terminal diagram with electric fuel pump safety circuit (continued)



- 1 = Mixture-control unit
- 1a = Fuel distributor
- 1b = Air-flow sensor
- 1c = Electro-hydraulic pressure actuator
- 2 = Pressure regulator, primary pressure
- 3 = Fuel filter
- 4 = Electric fuel pump
- 5 = Fuel accumulator
- 6 = Fuel tank
- 7 = Injection valve
- 8 = Cold-start valve
- 9 = Temperature sensor engine (Double NTC)
- 10 = Idle actuator
- 11 = Throttle-valve switch, idle/full load

DIAGRAM OF AIR AND FUEL LINES

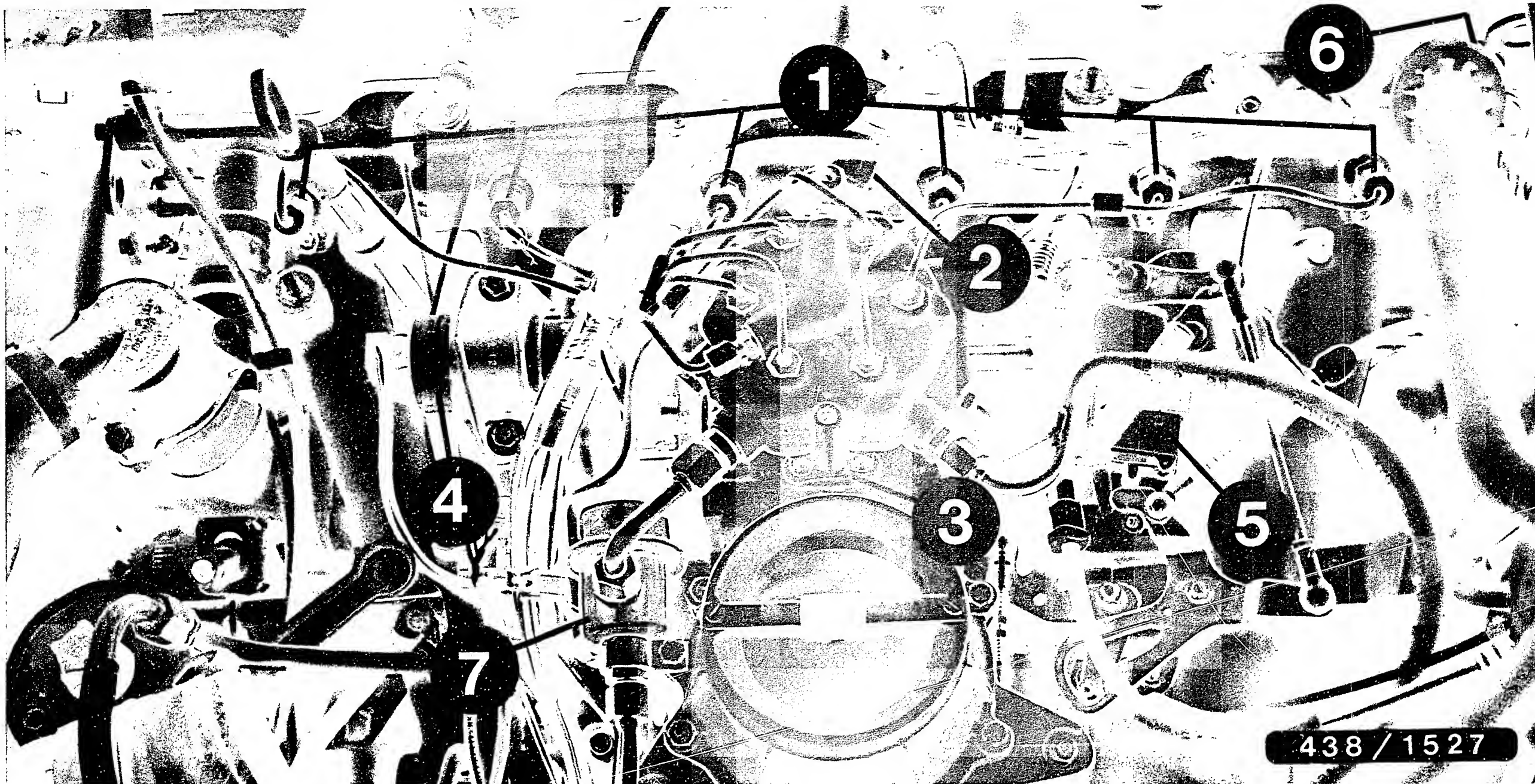


- 1 = Electronic relay for electric-fuel-pump and cold-start valve actuation
- 2 = Over-voltage protection relay
- 3 = KE-Jetronic control unit
- 4 = ABS controller (if present)

In Type 126, the electric fuel pump relay and the over-voltage protection relay are positioned in the engine compartment on the left.

The KE-Jetronic control unit and the mixture map trimming plug are installed in the footwell on the right behind the side panel in the Type 126.

INSTALLATION POSITION OF COMPONENTS



1 = Fuel-injection valves
 2 = Start valve
 3 = Mixture-control unit
 4 = Idle actuator

5 = Throttle-valve switch, idle
 (microswitch on accelerator linkage)
 6 = Engine-temperature sensor (concealed)
 7 = Pressure regulator

INSTALLATION POSITION OF COMPONENTS

TABLE OF CONTENTS

Trouble-shooting instructions : MB-5030

BOSCH system : KE 3.1 - Jetronic

Make of vehicle : MERCEDES-BENZ

Basic microcard : PKW-014

| Test instructions | Coordinates |
|---|-------------|
| Special features..... | 02 |
| Self-diagnosis / Rapid diagnosis chart..... | 09 - 20 |
| Test specifications..... | 03 - 08 |
| Electrical terminal diagram..... | 21 - 24 |
| Electrical wiring diagram..... | |
| Hydraulic-lines diagram..... | |
| Diagram of air/fuel lines..... | 25 |
| Tools and test equipment..... | |
| Testing and adjustment instructions..... | |
| Installation position of components..... | 26 - 28 |
| Notes on removal and installation..... | |
| General important information..... | |

Note:

Items without coordinate details are not applicable in these trouble-shooting instructions.

SPECIAL FEATURES

* This microcard contains the trouble-shooting instructions, valid at the time of publication, for the following Mercedes-Benz model:

190 E 2,6 2,6l/6Zyl. US/J/AUS 09.86->

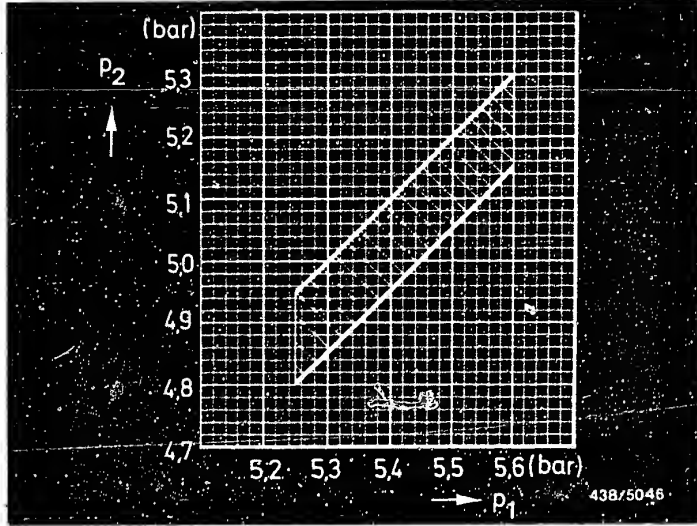
- * Trouble-shooting with these instructions may only then take place when the details of the "Summary - Service Information for Vehicles" (KFZ-000) coincide with those of the vehicle type and with the BOSCH number of the KE-Jetronic control unit installed.
- * Control unit using digital techniques, characteristic-map control using microprocessor.
- * Electronically controlled low-idle-speed control with single-winding rotary actuator, without bypass adjusting screw.
- * Activated-carbon filter and regeneration valve for return of gasoline vapors into the intake manifold. (Fuel evaporation system)

Important note:

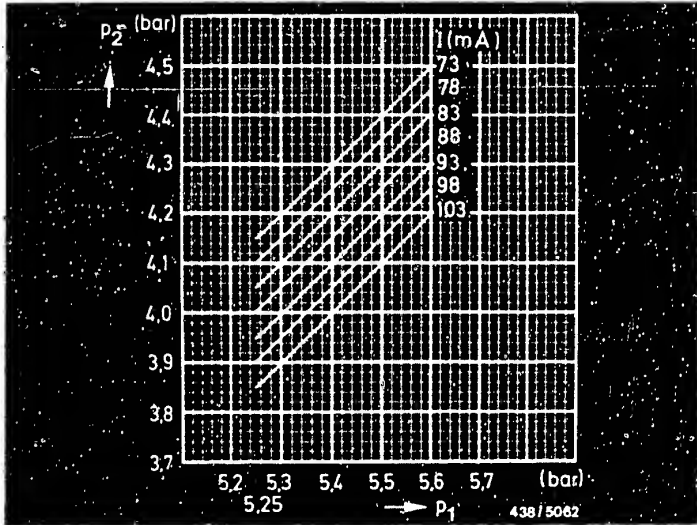
If reference is made to a basic microcard, always make sure you use the test specifications from the vehicle-specific brief instructions.

TEST SPECIFICATIONS

| No. | Testing/Test condition | Test specification | |
|-----|--|--|--|
| 1 | Electric fuel pump – fuel delivery: | At least 1300 cm ³ /min | |
| 2 | Primary pressure: | 5,25...5,6 bar | |
| 3 | Differential pressure: Suppression of peak coil current: Actuate starting motor with fuel–pump relay disconnected. <u>Do not</u> switch off ignition after starting. Take lower–chamber pressure set value "warm" from top chart corresponding to primary pressure measured. (Actuator current 0 mA) Take lower–chamber pressure set value "cold" from bottom chart corresponding to primary pressure measured and actuator current. Tolerance ± 0.15 bar. Simulation of "cold" state: press push–button 3 at test adapter. | | |
| 4 | Leakage test, complete system: Minimum pressure after 10 mins: Minimum pressure after 20 mins: | 2,7 bar 2,6 bar | |
| 5 | Injection valves, opening pressure: | 3,0...4,1 bar | |
| 6 | Fuel deliveries, comparative measurement: (Actuator current 0 mA) Idle: Part load: Full load: Min. delivery at max. air–flow sensor plate defl.: | Setting point: (cm ³ /min) 6,0 40,0 100,0 | Max. permis. delivery: (cm ³ /min) 6,6 42,5 109,0 |
| | | 140 cm ³ /min | |



p 1 = Primary pressure
p 2 = Lower-chamber pressure

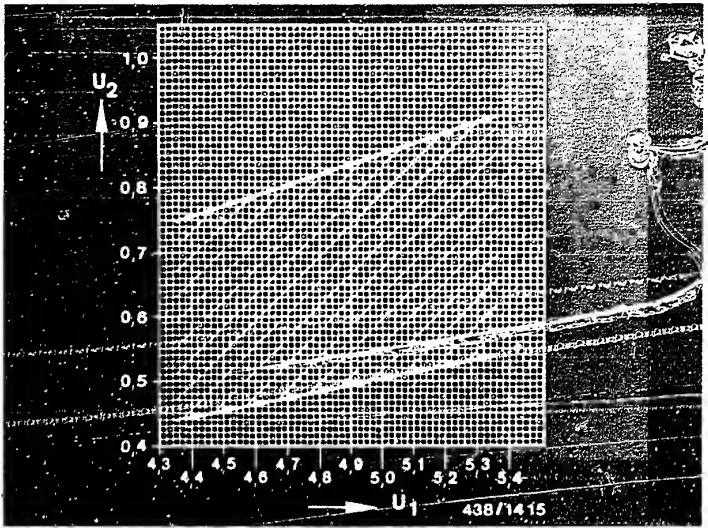


TEST SPECIFICATIONS (CONTINUED)

[illegible]

TEST SPECIFICATIONS (CONTINUED)

| No. | Testing/Test condition | Test specification |
|-----|--|---------------------------------------|
| 12 | <p>Signal, air-flow sensor potentiometer:</p> <p>(Checking necessary when poor idle and/or part-load behavior)</p> <p>Measurement using test adapter and voltmeter.</p> <p>Determine supply voltage of potentiometer: Set value (test adapter, V-position 10):</p> <p>Determine potentiometer signal at idle speed. (Test adapter, V-position 11) Set value corresponding to supply voltage:</p> <p>Adjust signal if necessary at trimming potentiometer (at right next to potentiometer pins).</p> <p>Afterwards, re-secure adjusting screw of trimming potentiometer using black sealing compound (e.g Teroson).</p> | <p>4,35...5,35 V</p> <p>See chart</p> |



U 1 = Supply voltage
potentiometer

U 2 = Potentiometer
voltage signal

SELF-DIAGNOSIS

All Daimler-Benz 4- and 6-cylinder engines in the current series (approx. 10.85) are equipped with self-diagnosis using on-off ratio measurement.

Incorrect input signals from the KE-Jetronic control unit can be displayed with the lambda closed-loop tester at the lambda test output (diagnosis socket, socket 3).

This provides information on short and open circuits. Defects which occur sporadically (e.g. loose contacts) are not indicated. Output of fault signals has priority over output of the lambda closed-loop signal.

We will not go into the defects which can be indicated in more detail here, since the input signals of the KE-Jetronic control unit can be tested with the universal test adapter (rapid-diagnosis chart).

However, if when testing the lambda closed-loop control by means of on-off ratio measurement, a constant on-off ratio is indicated, then the input signals of the KE-Jetronic control unit should be tested (rapid diagnosis chart).

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 WITH KE3 ADAPTER LEAD 1 684 463 169 AND APPROPRIATE MULTITESTER:

The following rapid diagnosis chart makes it possible for the experienced Jetronic expert to quickly check the electric/electronic peripheral and control-unit functions of the the KE-Jetronic, including the lambda closed-loop control.

Important note on the rapid diagnosis chart:

The "Test conditions" column gives information as to in which test steps the control-unit plug must be connected/disconnected. Make absolutely certain that there is no current at the system when connecting or disconnecting, i.e. the ignition must be switched off and the electric safety circuit must not be short circuited.

The "Test connections" column provides information about the leads connected to the respective measuring path, referring to the assignment in the control-unit plug. Possibly-necessary trouble-shooting is with regard to these leads.

A t t e n t i o n :

When carrying out the test, make sure that the trimming plug is in position 1.

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

| No. | Switch/Btn V Ω Bt n | Under test | Test pins | Test conditions | Test specifications |
|-----|---------------------------------|---|--------------|--|--|
| 1 | V 4 | - Internal resistance (R ₁) pressure actuator | 12-10 | Disconnect control-unit plug. | 20...30 Ω |
| 2 | V 5 | - Resistance NTC II (engine) | 21- 2 | Engine temperature +15...+30°C; approx. +80°C: | 1,3...3,6 k Ω 250...390 Ω |
| 3 | | Resistance NTC I (intake air) | | Air temperature in area of NTC I = +15...+30°C: | Test step not applicable |
| 4 | V 6 | - Signal, altitude sensor | 11- 2 | Connect control unit. Switch on ignition. Voltmeter connection to blue Ω -sockets. Signal altitude-dependent: 0 meters (sea level): 500 meters: 1000 meters: 1500 meters: 2000 meters: 3000 meters: | 3,2...4,5 V 2,8...4,0 V 2,4...3,5 V 2,0...3,0 V 1,6...2,5 V 0,8...1,6 V |
| 5 | V 9 | - Throttle-valve switch, idle | 13- 2 | Switch off ignition. Disconnect control-unit lead plug. Throttle valve closed: open: | 0...10 Ω > 1000 Ω |
| 6 | V 10 | - Throttle-valve switch, full load | 5- 2 | Throttle valve closed: fully open: | > 5000 Ω 0...10 Ω |
| 7 | V 11 | - Microswitch idle linkage | 24- 2 | Throttle valve closed: open: | 0...10 Ω infinite Ω |
| 8 | V 12 | - Ground, control unit | 20- 2 | | 0...10 Ω |
| 9 | V 13 | - Ground, pin 7 | 7- 2 | Switch off ignition. Connect control unit. | 0...10 Ω |

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

| No. | Switch/Btn V Ω Bt n | Under test | Test pins | Test conditions | Test specifications |
|-----|---------------------------------|------------|--------------|--|--|
| 10 | V | 14 - | 22- 2 | Disconnect control-unit plug. Disconnect lead plug from air-flow sensor potentiometer and connect socket 1 of plug (in upper installation position) to engine ground. Trimming-plug position 1: _____ 2: _____ 3: _____ 4: _____ 5: _____ 6: _____ 7: _____ | 0...10 Ω ____ Ω ____ Ω ____ Ω ____ Ω ____ Ω ____ Ω |
| 11 | V | 15 - | 16- 2 | Connect air-flow sensor potentiometer. Selection lever position P,N: Driving position selected: | 0...10 Ω infinite Ω |
| 12 | 5 | - | 25- 2 | TD signal Start engine (starting motor): | Voltage undefined |
| 13 | 6 | - | 1- 2 | Control-unit supply Switch on ignition: | 8...15 V |
| 14 | 7 | - | 3- 2 | Idle actuator supply and continuity Switch on ignition: | 8...15 V |
| 15 | 8 | - | 6- 2 | Speed signal Drive vehicle on chassis dynamometer or road: | Voltage undefined |
| 16 | 9 | - | 19- 2 | Air-conditioner cut-in signal Switch off ignition. Connect control unit. Start engine, switch on air conditioner. Temperature regulator = minimum temperature | 8...15 V |
| 17 | 10 | - | 18- 2 | Supply, air-flow sensor potentiometer Switch on ignition: | 4,35...5,35 V |

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

| No. | Switch/ V | Btn Ω | Bt n | Under test | Test pins | Test conditions | Test specifications |
|-----|--------------|-----------------|---------|---|--------------|--|---------------------------------------|
| 18 | 11 | - | - | Signal, air-flow sensor potentiometer | 17- 2 | Switch on ignition. Air-flow sensor plate in neutral position: Deflect air-flow sensor plate by hand, continuous rise up to max.: | 0 V 5,35 V |
| 19 | 13 | - | 1 | Temperature signal from control unit | 9- 2 | Switch on ignition. While actuating btn 1: | 1,5...1,9 V |
| 20 | 14 | - | - | Consumption signal | 4- 2 | Start engine - idle: With regulation: | Voltage undefined Voltage change |
| 21 | - | - | - | Peak coil current | 12-12 | Switch on ignition: | ->FD — : — mA FD 649->: 18...22 mA |
| 22 | - | 21 | 1 | Warm-up enrichment + 20° C | 12-12 | Warm up engine - idle. Current value with btn 1 pressed: | ->FD — : — mA FD 649->: 2...5 mA |
| 23 | - | 24 | 2 | Actuator current engine at normal operating temperature | 12-12 | Engine at normal operating temperature, idle. Current value with btn 2 pressed; reading oscillating, mean value: | ->FD — : — mA FD 649->: -1...+1 mA |
| 24 | - | 21 | 2 | Starting enrichment | 12-12 | So that engine fails to start: Disconnect speed relay for electric fuel pump. Short circuit ignition coil term.4 to ground via resistance of at least 2k Ω . (e.g. with sleeve-type suppressor and spark gap) While btn 2 pressed, actuate starting motor. Current rise (max. 1 sec.) to: | ->FD — : — mA FD 649->: 40...60 mA |

FD = Date of manufacture

F15 — <==>

F16 — <==>

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

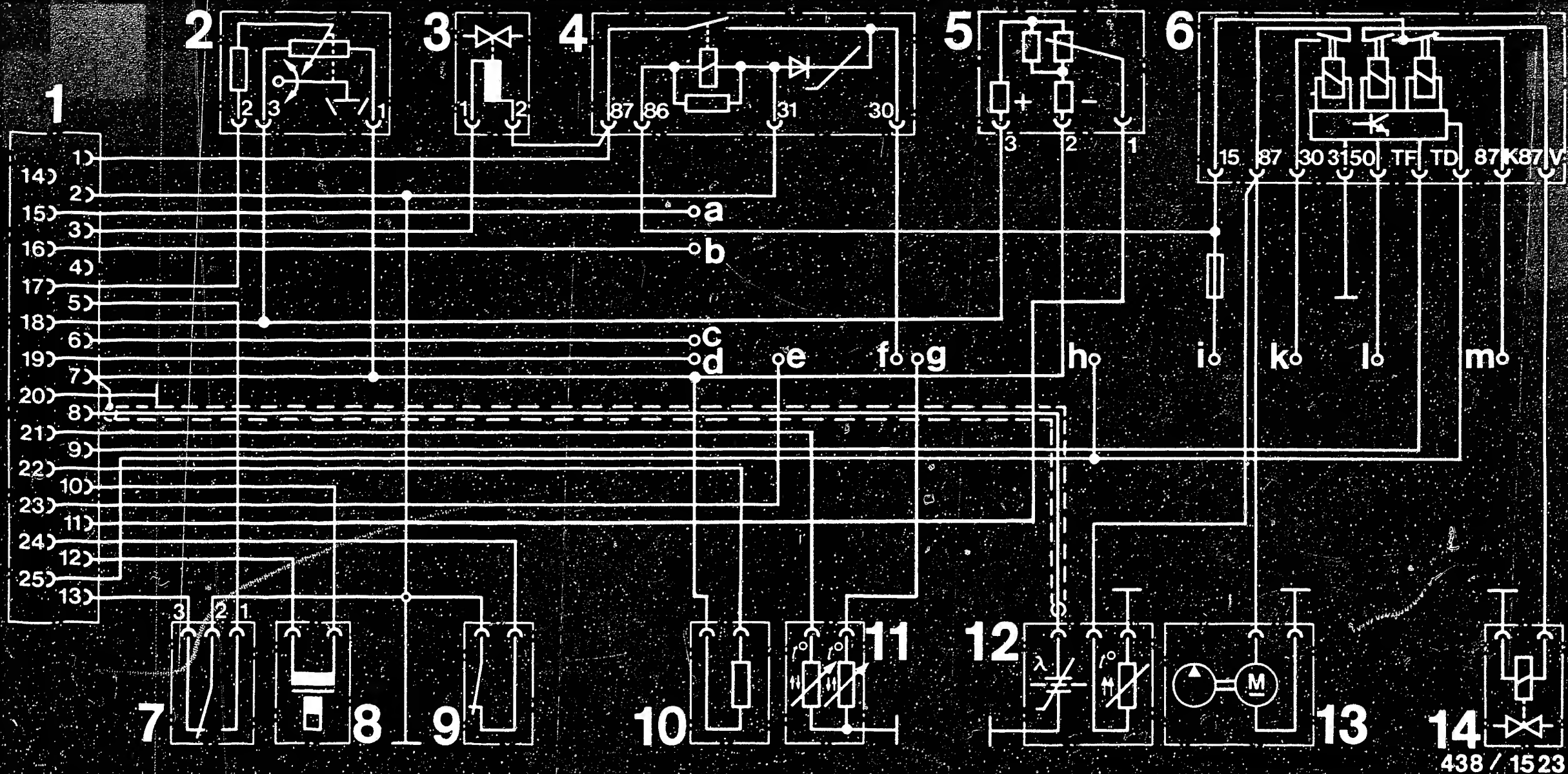
| No. | Switch/ V | Btn Ω | Under test | Test pins | Test conditions | Test specifications |
|-----|--------------|-----------------|------------|--------------|---|--|
| 25 | - | 21 | 1 | 12-12 | Post-start enrichment Start engine (at normal operating temperature) while actuating btn 1. Current value: Current value constant for a few seconds, then slow speed regulation. | ->FD _____ : _____ mA FD 649->: 4...8 mA |
| 26 | - | 21 | 1 | 12-12 | Acceleration enrichment Engine at normal operating temperature, idle. While actuating btn 1, perform snap acceleration of engine. Thus current rise (approx. 1 sec.) to: Note: Level of current value dependent upon intensity of acceleration (travel/duration of air-flow sensor plate movement). | ->FD _____ : _____ mA FD 649->: 40...60 mA |
| 27 | - | - | - | 12-12 | Overrun cut-off Re-connect ohmmeter (swap positive and negative). Start engine (normal operating temperature). Drive vehicle on chassis dynamometer or road. Increase speed n briefly to at least approx.: Current reading during falling speed phase: (idle throttle-valve switch closed) | ->FD _____ : _____ min ⁻¹ FD 649->: 2000 min ⁻¹ -40...-80 mA |

FD = Date of manufacture

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

| No. | Switch/Btn | | | Under test | Test pins | Test conditions | Test specification |
|-----|------------|----------|------|--|-----------|--|--|
| | V | Ω | Bt n | | | | CAT |
| 28 | - | 24 | - | Full-load enrichment | 12-12 | <p>Engine at normal operating temperature, idle.</p> <p>Reading oscillating, mean value:</p> <p>Briefly push accelerator pedal to floor (full-load throttle-valve switch must switch).</p> <p>During speed rise, current value rises by:</p> <p>A t t e n t i o n: Do this very briefly, so that speed does not rise too much and engine is not damaged.</p> | <p>->FD —: — mA FD 649 ->: -1...+1 mA</p> <p>->FD —: — mA FD 649 ->: 6...10 mA</p> |
| 29 | - | 21 | - | Lambda closed-loop control, open-loop control mode | 12-12 | <p>Disconnect regeneration lead to throttle-valve assembly at generation valve and seal.</p> <p>Engine at norm. op. temp., idle. Current value:</p> | -1...+1 mA |
| 30 | - | 24 | - | Lambda closed-loop control, closed-loop control mode | 12-12 | <p>Engine at norm. op. temp., idle.</p> <p>Closed-loop control mode can be recognized from the oscillating current reading.</p> <p>Mean value:</p> <p>If mean value outside tolerance, set (idle-mixture-adjusting screw) to approx.:</p> | <p>-1...+1 mA</p> <p>0 mA</p> |
| 31 | - | 22 | - | Lambda closed-loop control, rich stop | 12-12 | <p>Engine at norm. op. temp., idle.</p> <p>Current rise to:</p> | 12...16 mA |
| 32 | - | 23 | - | Lambda closed-loop control, lean stop | 12-12 | <p>Engine at norm. op. temp., idle.</p> <p>Current drop to:</p> | -8...-12 mA |

*) FD = Date of manufacture



438 / 1523

1 = Control unit, KE-Jetronic
 2 = Air-flow sensor potentiometer
 3 = Idle actuator

4 = Over-voltage protection relay

5 = Altitude sensor

6 = Electronic relay for electric fuel pump
 and cold-start valve actuation

7 = Throttle-valve switch, idle/full load

ELECTRICAL TERMINAL DIAGRAM WITH ELECTRIC FUEL PUMP SAFETY CIRCUIT

8 = Electro-hydraulic pressure actuator

9 = Throttle-valve switch, idle/linkage

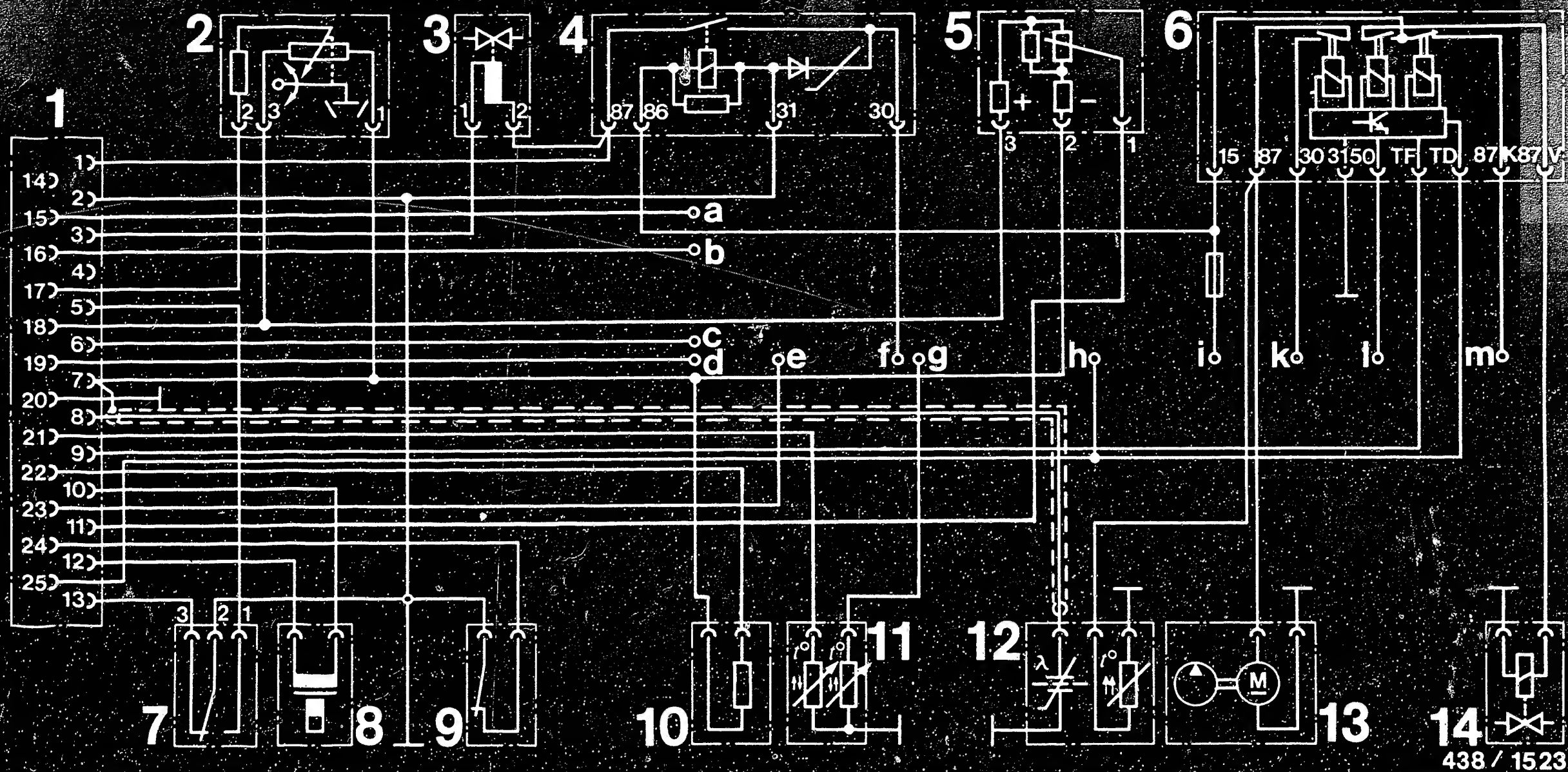
10 = Trimmer resistor, mixture map

11 = Temperature sensor, engine (Double NTC)

12 = Heated lambda sensor

13 = Electric fuel pump

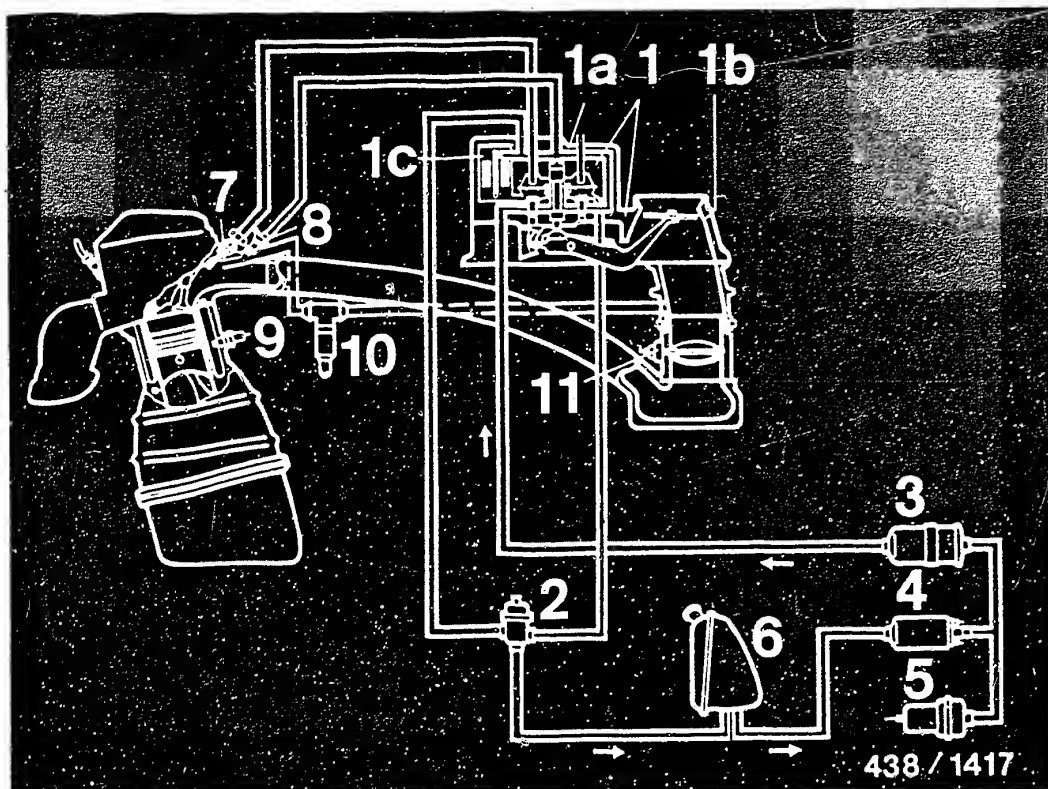
14 = Cold-start valve



a = Lambda malfunction indicator
 b = Transmission switch
 c = Speed signal
 d = Control-unit connection, air conditioner
 e = Lambda meas. output (diag. socket, socket 3)
 f = Terminal 30

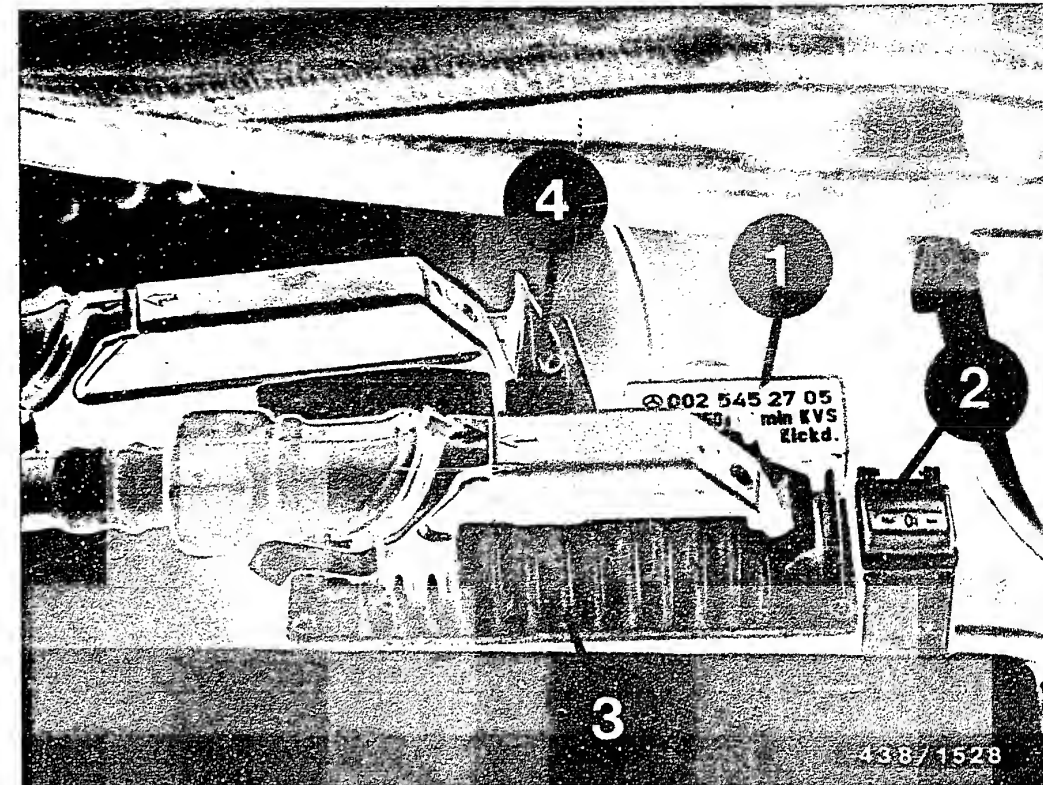
g = Ignition system (EL-I)
 h = Terminal TD, ignition
 i = Terminal 15
 k = Terminal 30
 l = Terminal 50
 m = Kickdown switch, socket 1

ELECTRICAL TERMINAL DIAGRAM WITH ELECTRICAL FUEL PUMP SAFETY CIRCUIT (CONTINUED)



- 1 = Mixture-control unit
- 1a = Fuel distributor
- 1b = Air-flow sensor
- 1c = Electro-hydraulic pressure actuator
- 2 = Pressure regulator, primary pressure
- 3 = Fuel filter
- 4 = Electric fuel pump
- 5 = Fuel accumulator
- 6 = Fuel tank
- 7 = Injection valve
- 8 = Cold-start valve
- 9 = Temperature sensor engine (Double NTC)
- 10 = Idle actuator
- 11 = Throttle-valve switch, idle/full load

DIAGRAM OF AIR AND FUEL LINES

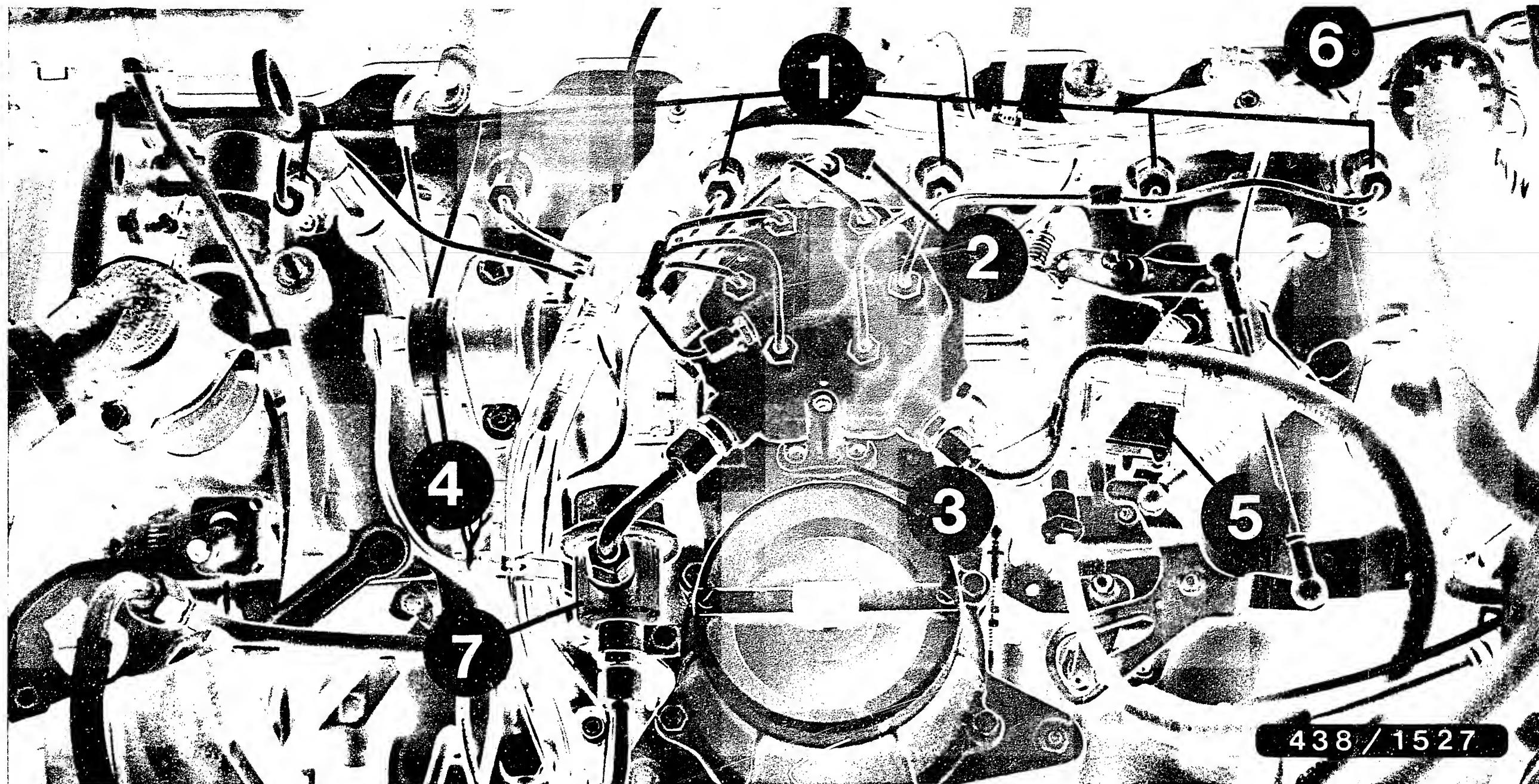


- 1 = Electronic relay for electric-fuel-pump and cold-start valve actuation
- 2 = Over-voltage protection relay
- 3 = KE-Jetronic control unit
- 4 = ABS controller (if present)

In Type 126, the electric fuel pump relay and the over-voltage protection relay are positioned in the engine compartment on the left.

The KE-Jetronic control unit and the mixture map trimming plug are installed in the footwell on the right behind the side panel in the Type 126.

INSTALLATION POSITION OF COMPONENTS



1 = Fuel-injection valves
 2 = Start valve
 3 = Mixture-control unit
 4 = Idle actuator

5 = Throttle-valve switch, idle
 (microswitch on accelerator linkage)
 6 = Engine-temperature sensor (concealed)
 7 = Pressure regulator

INSTALLATION POSITION OF COMPONENTS

TABLE OF CONTENTS

| | |
|---|-------------------|
| Trouble-shooting instructions | : MB-5010 |
| BOSCH system | : KE 3.1-Jetronic |
| Vehicle make | : MERCEDES-BENZ |
| Basic microcard | : PKW-014 |
| <hr/> | |
| Test instructions | Coordinates |
| Special features..... | G02 |
| Self-diagnosis/Rapid diagnosis chart..... | G07 - G18 |
| Test specifications..... | G03 - G06 |
| Electrical terminal diagram..... | G19 - G22 |
| Electrical wiring diagram..... | |
| Hydraulic-lines diagram..... | |
| Diagram of air/fuel lines..... | |
| Tools and test equipment..... | |
| Testing and adjustment instructions..... | |
| Installation position of components..... | G23 - G25 |
| Notes on removal and installation..... | |
| General important information..... | |

Tests without coordinate details are not applicable in these trouble-shooting instructions.

SPECIAL FEATURES

- * This microcard contains the trouble-shooting instructions, valid at the time of publication, for the following Mercedes-Benz model:

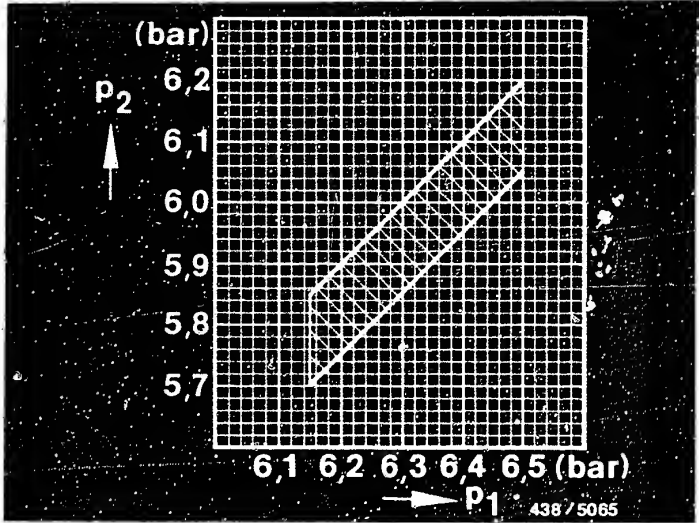
420 SEL, 4,2 1/8 Zyl. (USA,J,AUS) 09.85->
- * Trouble-shooting with these instructions may only then take place when the details of the "Summary - Service Information for Vehicles" (KFZ-000) coincide with those of the vehicle type and with the BOSCH number of KE-Jetronic control unit installed.
- * Control unit using digital techniques, characteristic-map control using microprocessor.
- * Electronically controlled low-idle-speed control with single-winding rotary actuator, without bypass adjusting screw.
- * Activated-carbon filter and regeneration valve for return of gasoline vapors into the intake manifold. (Fuel evaporation system)
- * Secondary-air injection

Important note:

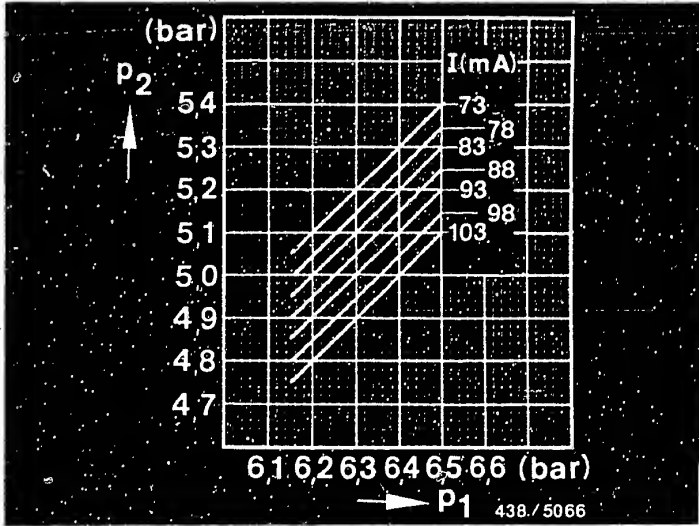
If reference is made to a basic microcard, always make certain you use the test specifications from the vehicle-specific brief instructions.

TEST SPECIFICATIONS

| No. | Testing/Test condition | Test specification | |
|-----|--|--|--|
| 1 | Electric fuel pump – fuel delivery: | At least 1650 cm ³ /min | |
| 2 | Primary pressure: | 6,15...6,5 bar | |
| 3 | Differential pressure: Suppression of peak coil current: Actuate starting motor with fuel-pump relay disconnected. <u>Do not</u> switch off ignition after starting. Take lower-chamber pressure set value "warm" from top chart corresponding to primary pressure measured. (Actuator current 0 mA) Take lower-chamber pressure set value "cold" from bottom chart corresponding to primary pressure measured and actuator current. Tolerance ± 0.15 bar. Simulation of "cold" state: press push-button 3 at test adapter. | | |
| 4 | Leakage test, complete system: Minimum pressure after 10 mins: Minimum pressure after 20 mins: | 3,3 bar 3,2 bar | |
| 5 | Injection valves, opening pressure: | 3,7...4,8 bar | |
| 6 | Fuel deliveries, comparative measurement: (Actuator current 0 mA) Idle: Part load: Full load: Min. delivery at max. air-flow sensor plate defl.: | Setting point: (cm ³ /min) 6,0 40,0 100,0 140,0 cm ³ /min | Max. permis. delivery: (cm ³ /min) 6,8 42,5 109,0 |



p₁ = Primary pressure
p₂ = Lower-chamber pressure



TEST SPECIFICATIONS (CONTINUED)

[illegible]

SELF-DIAGNOSIS

All Daimler-Benz 8-cylinder engines have been equipped as of FD 552 with self-diagnosis using on-off ratio measurement.

Defective input signals of the KE-Jetronic control unit may be indicated at the lambda test output (diagnosis socket outlet, socket 3) using the lambda closed-loop control tester.

Short circuiting and breaks in lines are detected. Sporadically occurring faults (e.g. loose contact) are not detected. Output of the fault signals takes priority over output of the lambda closed-loop control signal.

The faults which can be indicated are not discussed in detail here, since the input signals of the KE-Jetronic control unit may be tested using the universal test adapter (rapid diagnosis chart).

However, should a constant on-off ratio be indicated when testing the lambda closed-loop control using on-off ratio measurement, the input signals of the KE-Jetronic control unit must be checked (rapid diagnosis chart).

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 WITH KE3 ADAPTER LEAD 1 684 463 169 AND APPROPRIATE MULTITESTER:

The following rapid diagnosis chart makes it possible for the experienced Jetronic expert to quickly check the electric/electronic peripheral and control-unit functions of the the KE-Jetronic, including the lambda closed-loop control.

Important note on the rapid diagnosis chart:

The "Test conditions" column gives information as to in which test steps the control-unit plug must be connected/disconnected. Make absolutely certain that there is no current at the system when connecting or disconnecting, i.e. the ignition must be switched off and the electric safety circuit must not be short circuited.

The "Test connections" column provides information about the leads connected to the respective measuring path, referring to the assignment in the control-unit plug. Possibly necessary trouble-shooting is with regard to these leads.

A t t e n t i o n :

When carrying out the test, make sure that the trimming plug is in position 1.

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

| No. | Switch/Btn V Ω Bt n | Under test | Test pins | Test conditions | Test specifications |
|-----|---------------------------------|--|--------------|---|--|
| 1 | V | 4 - Internal resistance (R ₁) pressure actuator | 12-10 | Disconnect control-unit plug. | 20...30 Ω |
| 2 | V | 5 - Resistance NTC II (engine) | 21- 2 | Engine temperature +15...+30°C; approx. +80°C; | 1,3...3,6 k Ω 250...390 Ω |
| 3 | | Resistance NTC I (intake air) | | Air temperature in area of NTC I = +15...+30°C; | Test step not applicable |
| 4 | V | 6 - Signal, altitude sensor | 11- 2 | Connect control unit. Switch on ignition. Voltmeter connection to blue Ω-sockets. Signal altitude-dependent: 0 meters (sea level): 500 meters: 1000 meters: 1500 meters: 2000 meters: 3000 meters: | 3,2...4,5 V 2,8...4,0 V 2,4...3,5 V 2,0...3,0 V 1,5...2,5 V 0,8...1,6 V |
| 5 | V | 9 - Throttle-valve switch, idle | 13- 2 | Switch off ignition. Disconnect control-unit lead plug. Throttle valve closed: open: | 0...10 Ω > 1000 Ω |
| 6 | V | 10 - Throttle-valve switch, full load | 5- 2 | Throttle valve closed: fully open: | > 5000 Ω 0...10 Ω |
| 7 | V | 11 - Microswitch idle linkage | 24- 2 | Throttle valve closed: open: | — Ω infinite Ω |
| 8 | V | 12 - Ground, control unit | 20- 2 | | 0...10 Ω |
| 9 | V | 13 - Ground, pin 7 | 7- 2 | Switch off ignition. Connect control unit. | 0...10 Ω |

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

| No. | Switch/Btn | | | Under test | Test pins | Test conditions | Test specifications |
|-----|------------|----------|------|---|-----------|---|---|
| | V | Ω | Bt n | | | | |
| 10 | V | 14 | - | Trimming plug mixture map | 22- 2 | Disconnect control-unit plug. Disconnect lead plug from air-flow sensor potentiometer and connect socket 1 of plug (in upper installation position) to engine ground. Trimming-plug position 1: 2: 3: 4: 5: 6: 7: | 0...10 Ω _____ Ω _____ Ω _____ Ω _____ Ω _____ Ω _____ Ω |
| 11 | V | 15 | - | Transmission switch (automatic transmission only) | 16- 2 | Connect air-flow sensor potentiometer. Selection lever in position P, N: Driving position selected: | 0...10 Ω > 3000 Ω |
| 12 | 5 | - | - | TD signal | 25- 2 | Start engine (starting motor): | Voltage undefined |
| 13 | 6 | - | - | Control-unit supply | 1- 2 | Switch on ignition: | 8...15 V |
| 14 | 10 | - | - | Supply, air-flow sensor potentiometer | 18- 2 | Switch off ignition. Connect control unit. Switch on ignition: | 4.35...5.35 V |
| 15 | 11 | - | - | Signal, air-flow sensor potentiometer | 17- 2 | Switch on ignition. Air-flow sensor plate in neutral position: Deflect air-flow sensor plate by hand, continuous voltage rise up to max.: | Approx. 0 V 5.35 V |
| 16 | 13 | - | 1 | Temperature signal from control unit | 9- 2 | Switch on ignition. While actuating btn 1: | 1.5...1.9 V |
| 17 | 14 | - | - | Consumption signal | 4- 2 | Start engine - idle: With regulation: | Voltage undefined Voltage change |

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

| No. | Switch/ V | Btn Ω | Under test | Test pins | Test conditions | Test specifications |
|-----|--------------|-----------------|------------|--|-----------------|---|
| 18 | - | - | - | Peak coil current | 12-12 | Switch on ignition: ->FD — : — mA FD 545->: 65...85 mA |
| 19 | - | 21 | 2 | Actuator current engine at normal operating temperature | 12-12 | Engine at normal operating temperature, idle. Current value with btn 2 depressed: ->FD — : — mA FD 545->: -1...+1 mA |
| 20 | - | 21 | 2 | Starting enrichment | 12-12 | So that engine fails to start: disconnect speed relay for electric fuel pump. Short-circuit ignition coil term. 4 to ground via resistance of at least 2 k Ω (e.g. with sleeve-type suppressor and spark gap). While btn 1 depressed, actuate starting motor. Current rise (max. 1 sec.) to: ->FD — : — mA FD 545->: 80...110 mA |
| 21 | - | 21 | 1 | Acceleration enrichment | 12-12 | Engine at normal operating temperature, idle. While actuating btn 1, perform snap acceleration of engine. Thus current rise (approx. 1 s) to: ->FD — : — mA FD 545->: 20...50 mA Note: Level of current value dependent upon intensity of acceleration (travel/duration of air-flow sensor flap movement). |

FD = Date of manufacture

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

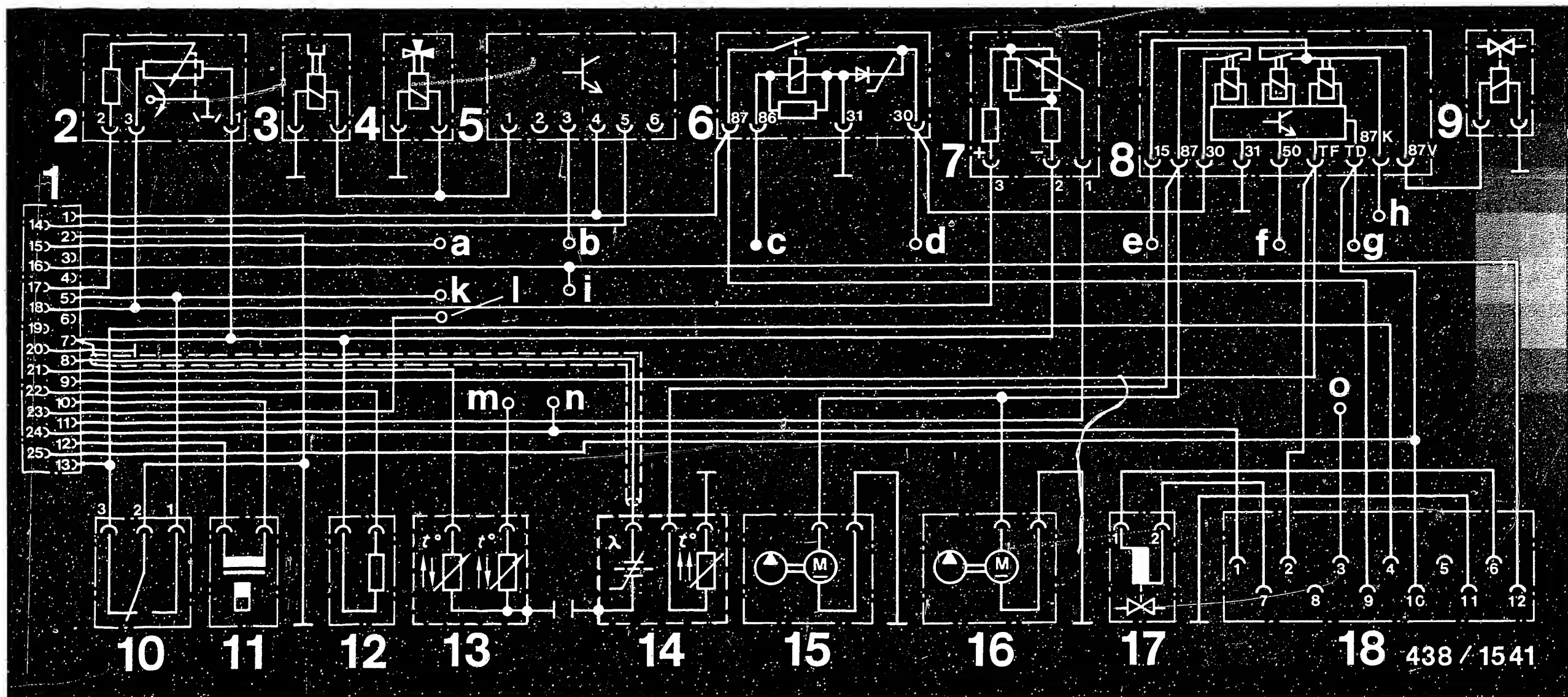
| No. | Switch/Btn | | | Under test | Test pins | Test conditions | Test specifications |
|-----|------------|----------|------|----------------------|-----------|--|--|
| | V | Ω | Bt n | | | | |
| 22 | - | - | - | Overrun cut-off | 12-12 | Re-connect ohmmeter (swap positive and negative). Start engine (normal op. temp.). Drive vehicle on vehicle-performance tester or road. Speed > 40 km/h. Engine speed $\geq 2500 \text{ min}^{-1}$. Vehicle in overrun. (Idle throttle-valve switch closed) Current reading: | -40...-80 mA |
| 23 | - | 21 | - | Full-load enrichment | 12-12 | Engine at normal operating temperature, idle. Current value: Briefly push accelerator pedal to floor (full-load throttle-valve switch must switch). During speed rise, current value rises by: A t t e n t i o n: Do this very briefly, so that speed does not rise too much and engine is not damaged. | ->FD — : — mA FD 545->: -1...+1 mA ->FD — : — mA FD 545->: 3...6 mA |

FD = Date of manufacture

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

| No. | Switch/Btn | | | Under test | Test pins | Test conditions | Test specifications |
|-----|------------|----------|---------|---|-----------|--|------------------------|
| | V | Ω | Bt n | | | | CAT |
| 24 | - | 24 | - | Lambda closed-loop control, closed-loop control operation | 12-12 | Disconnect regeneration lead to venturi assembly at regeneration valve and seal off. Engine at normal operating temperature, idle. Closed-loop control operation can be recognised from the oscillating current reading. Mean value: If mean value outside tolerance, set (idle-mixture-adjusting screw) to approx.: | -2...+2 mA 0 mA |
| 25 | - | 22 | - | Lambda closed-loop control, rich stop | 12-12 | Engine at normal operating temperature, idle. Current rise to: | 10...14 mA |
| 26 | - | 23 | - | Lambda closed-loop control, lean stop | 12-12 | Engine at normal operating temperature, idle. Current drop to: | -8...-12 mA |

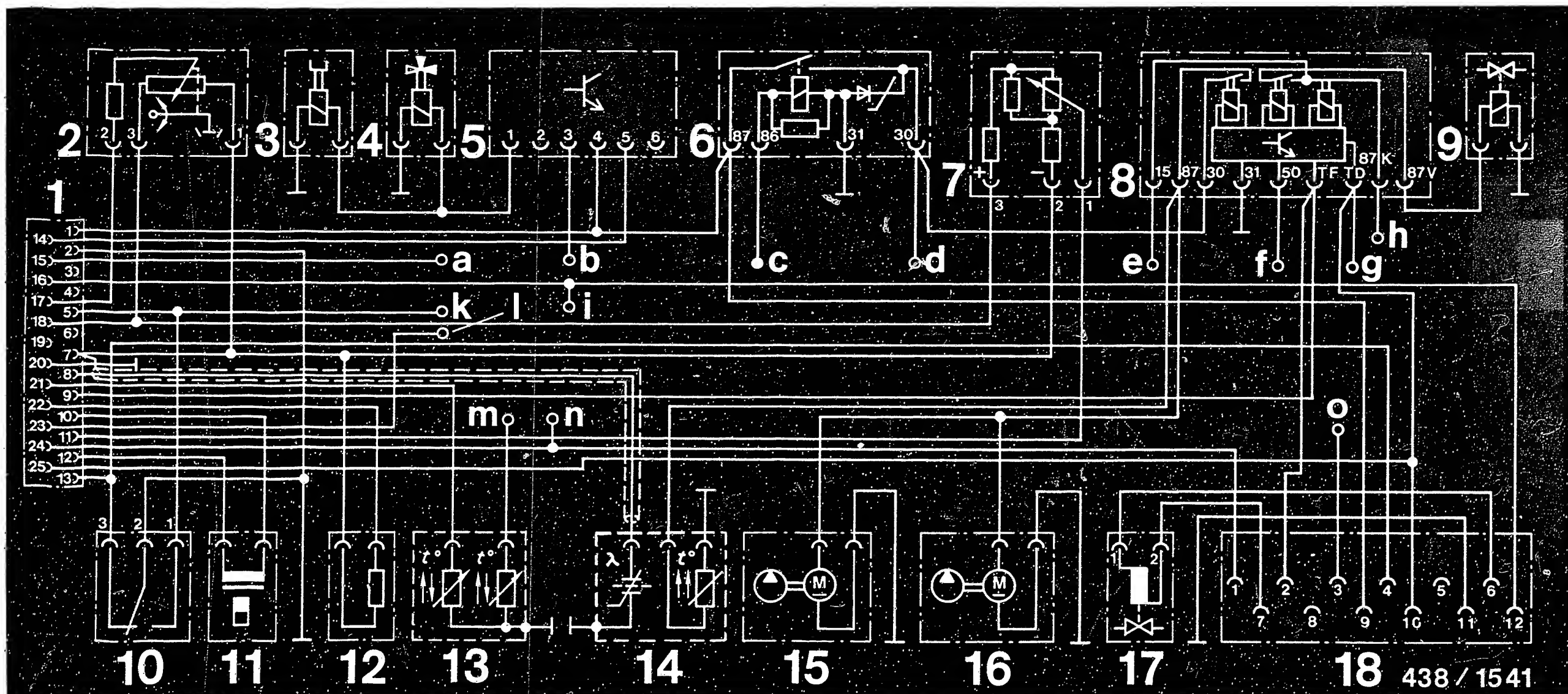
FD = Date of manufacture



- 1 = Control unit, KE-Jetronic
- 2 = Air-flow sensor potentiometer
- 3 = Electro-magnetic coupling, air pump
- 4 = Change-over valve, air pump
- 5 = Relay, air injection
- 6 = Over-voltage protection relay
- 7 = Altitude sensor
- 8 = Electronic relay
- 9 = Cold-start valve

- 10 = Throttle-valve switch, idle/full load
- 11 = Electro-hydraulic pressure actuator
- 12 = Trimmer resistor, mixture map
- 13 = Temperature sensor, coolant (Double NTC)
- 14 = Heated lambda sensor
- 15 = Electric fuel pump
- 16 = Electric fuel pump
- 17 = Idle actuator (non-Bosch product)
- 18 = Control unit, low-idle-speed control (non-Bosch product)

ELECTRICAL TERMINAL DIAGRAM WITH ELECTRIC FUEL PUMP SAFETY CIRCUIT



a = Lambda malfunction indicator

b = Terminal 15

c = Terminal 15

d = Terminal 30

e = Terminal 15

f = Plug connection, start-locking switch, socket 4

g = Terminal TD, ignition

h = Kick-down switch, socket 1

i = Plug connection, start-locking switch, socket 3

k = Trigger box, ignition system

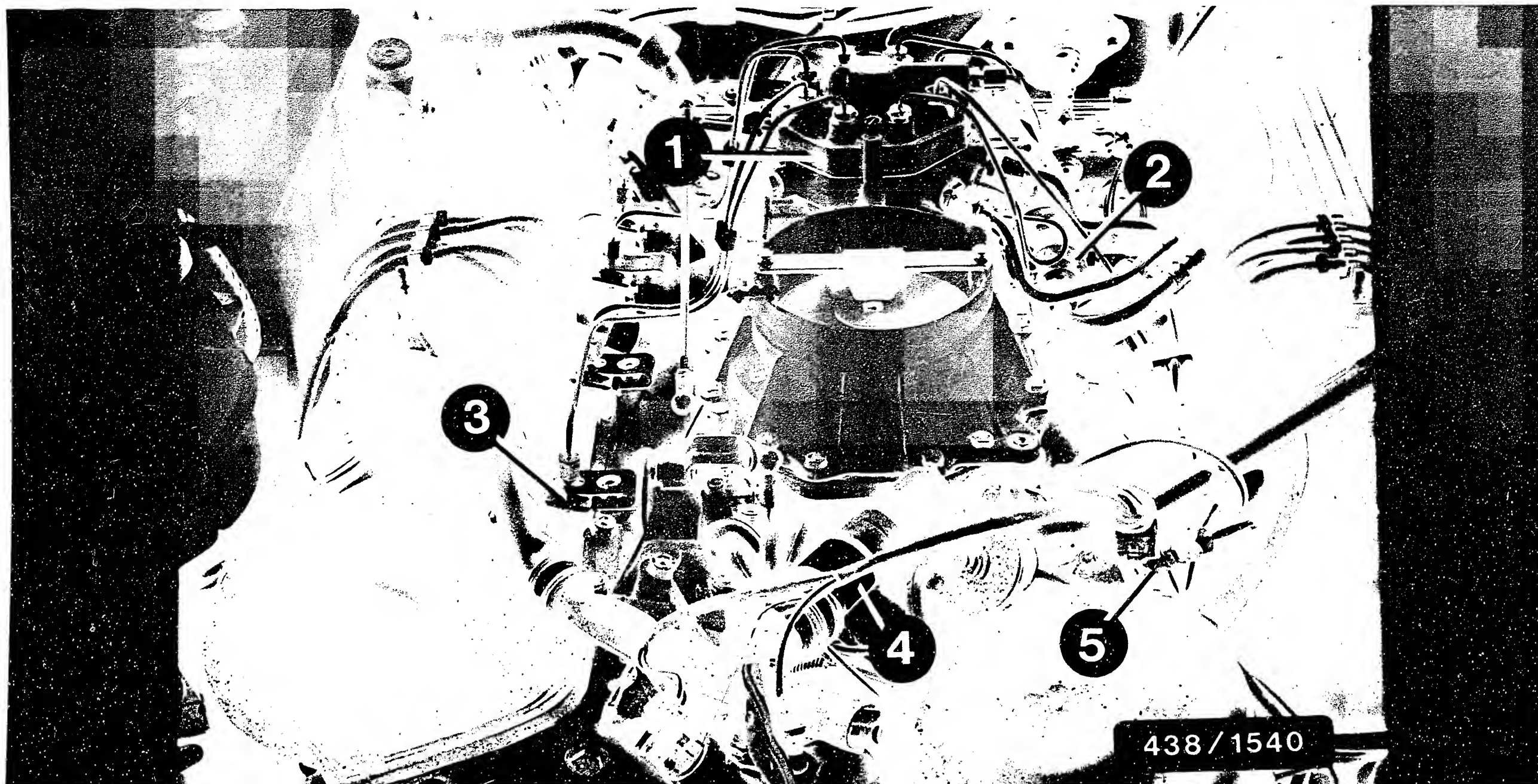
l = Lambda test output (diagnosis socket outlet, socket 3)

m = Trigger box, ignition system

n = Speed signal

o = Control unit, compressor cutoff

Electrical terminal diagram with electric fuel pump safety circuit (continued)



1 = Mixture-control unit
2 = Pressure regulator
3 = Injection valve

4 = Idle actuator (non-Bosch product)
5 = Cold-start valve

INSTALLATION POSITION OF COMPONENTS

Installation position of further components

KE-Jetronic control unit:

In footwell at right behind the side panel.

Relay, electric fuel pump:

In engine compartment at left.

Relay, over-voltage protection:

In engine compartment at left.

Temperature sensor, engine (NTC II):

At left (referring to forward direction of travel) at rear at cylinder head.

For production reasons:
continued on the following
coordinate.

TABLE OF CONTENTS

Trouble-shooting instructions : MB-5012
 BOSCH system : KE 3.1 - Jetronic
 Vehicle make : MERCEDES-BENZ
 Basic microcard : PKW-014

| Test instructions | Coordinates |
|---|-------------|
| Special features..... | H02 |
| Self-diagnosis/Rapid diagnosis chart..... | H07 - H18 |
| Test specifications..... | H03 - H06 |
| Electrical terminal diagram..... | H19 - H22 |
| Electrical wiring diagram..... | |
| Hydraulic-lines diagram..... | |
| Diagram of air/fuel lines..... | |
| Tools and test equipment..... | |
| Testing and adjustment instructions..... | |
| Installation position of components..... | H23 - H25 |
| Notes on removal and installation..... | |
| General important information..... | |

Tests without coordinate details are not applicable
 in these trouble-shooting instructions.

SPECIAL FEATURES

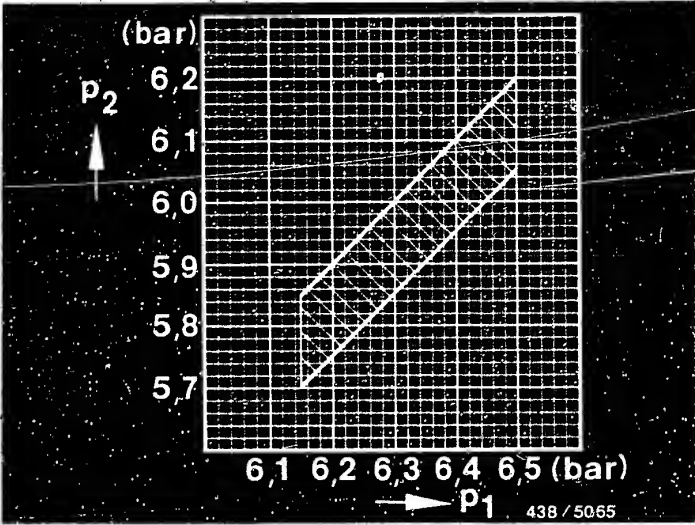
- * This microcard contains the trouble-shooting instructions, valid at the time of publication, for the following Mercedes-Benz model:
 560 SEL/SEC, 5,6l/8-Zyl.-Mot. (EU) 10.85->
- * Trouble-shooting with these instructions may only then take place when the details of the "Summary - Service Information for Vehicles" (KFZ-000) coincide with those of the vehicle type and with the BOSCH number of the KE-Jetronic control unit installed.
- * Control unit using digital techniques, characteristic-map control using microprocessor.
- * Electronically controlled low-idle-speed control with single-winding rotary actuator, without bypass adjusting screw.
- * Activated-carbon filter and regeneration valve for return of gasoline vapors into the intake manifold. (Fuel evaporation system)

Important note:

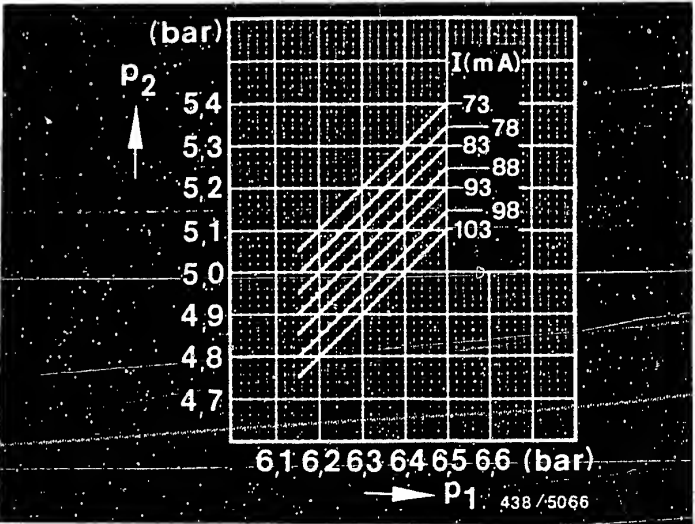
If reference is made to a basic microcard, always make sure you use the test specifications from the vehicle-specific brief instructions.

TEST SPECIFICATIONS

| No. | Testing/Test condition | Test specification | |
|-----|--|--|--|
| 1 | Electric fuel pump – fuel delivery: | At least 2200 cm ³ /min | |
| 2 | Primary pressure: | 6,15...6,5 bar | |
| 3 | Differential pressure: Suppression of peak coil current: Actuate starting motor with fuel-pump relay disconnected. <u>Do not</u> switch off ignition after starting. Take lower-chamber pressure set value "warm" from top chart corresponding to primary pressure measured. (Actuator current 0 mA) Take lower-chamber pressure set value "cold" from bottom chart corresponding to primary pressure measured and actuator current. Tolerance ± 0.15 bar. Simulation of "cold" state: press push-button 3 at test adapter. | | |
| 4 | Leakage test, complete system: Minimum pressure after 10 mins: Minimum pressure after 20 mins: | 3,3 bar 3,2 bar | |
| 5 | Injection valves, opening pressure: | 3,7...4,8 bar | |
| 6 | Fuel deliveries, comparative measurement: (Actuator current 0 mA) Idle: Part load: Full load: Min. delivery at max. air-flow sensor plate defl.: | Setting point: (cm ³ /min) 6,0 40,0 100,0 140,0 cm ³ /min | Max. permis. delivery: (cm ³ /min) 6,8 42,5 109,0 |



p 1 = Primary pressure
p 2 = Lower-chamber pressure



| No. | Testing/Test condition | Test specification |
|-----|--|--|
| 7 | Rate of flow, KE restriction: | 130...150 cm ³ /min |
| 8 | Temperature sensor, air (NTC I): Air temperature +15...+30°C: | 1,3...3,6 k Ω |
| 9 | Temperature sensor, engine (NTC II): Engine cold (+15...+30°C): Engine warm (approx. +80°C): | 1,3...3,6 k Ω 250...390 Ω |
| 10 | Idle-mixture-adjusting screw basic setting: Fuel-distributor seat - needle bearing: | 22,6...22,8 mm |
| 11 | Idle adjustment: Low-idle-speed control (non-Bosch product). For testing, engine at norm. op. temperature. Idle speed: Idle-actuator current at idle speed: Engage driving position, speed: CO concentration in exhaust gas: Adjustment at idle-mixture-adjusting screw. After adjustment, repeat measurement. | 600...700 min ⁻¹ 700...1000 mA 500...600 min ⁻¹ 1,0...2,0 % by vol. |

SELF-DIAGNOSIS

All Daimler-Benz 8-cylinder engines have been equipped as of FD 552 with self-diagnosis using on-off ratio measurement.

Defective input signals of the KE-Jetronic control unit may be indicated at the lambda test output (diagnosis socket outlet, socket 3) using the lambda closed-loop control tester.

Short circuiting and breaks in lines are detected. Sporadically occurring faults (e.g. loose contact) are not detected. Output of the fault signals takes priority over output of the lambda closed-loop control signal.

The faults which can be indicated are not discussed in detail here, since the input signals of the KE-Jetronic control unit may be tested using the universal test adapter (rapid diagnosis chart).

However, should a constant on-off ratio be indicated when testing the lambda closed-loop control using on-off ratio measurement, the input signals of the KE-Jetronic control unit must be checked (rapid diagnosis chart).

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 WITH KE3 ADAPTER LEAD 1 684 463 169 AND APPROPRIATE MULTITESTER:

The following rapid diagnosis chart makes it possible for the experienced Jetronic expert to quickly check the electric/electronic peripheral and control-unit functions of the the KE-Jetronic, including the lambda closed-loop control.

Important note on the rapid diagnosis chart:

The "Test conditions" column gives information as to in which test steps the control-unit plug must be connected/disconnected. Make absolutely certain that there is no current at the system when connecting or disconnecting, i.e. the ignition must be switched off and the electric safety circuit must not be short circuited.

The "Test connections" column provides information about the leads connected to the respective measuring path, referring to the assignment in the control-unit plug. Possibly necessary trouble-shooting is with regard to these leads.

A t t e n t i o n :

When carrying out the test, make sure that the trimming plug is in position 1.

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

| No. | Switch/Btn V Ω Bt n | Under test | Test pins | Test conditions | Test specifications |
|-----|---------------------------------|------------|---|---|-----------------------------|
| 1 | V | 4 - | Int. resistance(R ₁) pressure actuator | 12-10 Disconnect control-unit lead plug. | 20...30 Ω |
| 2 | V | 5 - | Resistor NTC II (engine) | 21- 2 Engine temperature +15°...+30° C; approx. +80° C; | 1,3...3,6k Ω 250...390 Ω |
| 3 | V | 6 - | Resistor NTC I (intake air) | 11- 2 Air temperature in area of NTC I; +15°...+30° C; | 1,3...3,6k Ω |
| 4 | | | Signal, altitude sensor | Connect control unit. Switch on ignition. Voltmeter connection to blue Ω sockets. Signal altitude-dependent: 0 meters (sea level); 500 meters; 1000 meters; 1500 meters; 2000 meters; 3000 meters; | Test step not applicable! |
| 5 | V | 9 - | Throttle-valve switch, idle | 13- 2 Switch off ignition. Disconnect control-unit lead plug. Throttle valve closed; open; | 0...10 Ω > 1000 Ω |
| 6 | V | 10 - | Throttle-valve switch, full load | 5- 2 Throttle valve closed; fully open; | > 5000 Ω 0...10 Ω |
| 7 | V | 11 - | Microswitch idle linkage | 24- 2 Throttle valve closed; open; | — Ω infinite Ω |
| 8 | V | 12 - | Ground, control unit | 20- 2 | 0...10 Ω |
| 9 | V | 13 - | Ground, pin 7 | 7- 2 Switch off ignition. Connect control unit. | 0...10 Ω |

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

| No. | Switch/Btn V | Ω | Bt n | Under test | Test pins | Test conditions | Test specifications |
|-----|-----------------|----------|---------|---|--------------|---|---|
| 10 | V | 14 | - | Trimming plug mixture map | 22- 2 | Disconnect control-unit plug. Disconnect lead plug from air-flow sensor potentiometer and connect socket 1 of plug (in upper installation position) to engine ground. Trimming-plug position 1: 2: 3: 4: 5: 6: 7: | 50... 60 Ω 100...120 Ω 150...190 Ω 230...270 Ω 330...370 Ω 430...470 Ω 570...620 Ω |
| 11 | V | 15 | - | Transmission switch (automatic trans- mission only) | 16- 2 | Connect air-flow sensor potentiometer. Selection lever in position P, N: Driving position selected: | 0...10 Ω > 3000 Ω |
| 12 | 5 | - | - | TD signal | 25- 2 | Start engine (starting motor): | Voltage undefined |
| 13 | 6 | - | - | Control-unit supply | 1- 2 | Switch on ignition: | 8...15 V |
| 14 | 10 | - | - | Supply, air-flow sensor potentiometer | 18- 2 | Switch off ignition. Connect control unit. Switch on ignition: | 4.35...5.35 V |
| 15 | 11 | - | - | Signal, air-flow sensor potentiometer | 17- 2 | Switch on ignition. Air-flow sensor plate in neutral position: Deflect air-flow sensor plate by hand, continuous voltage rise up to max.: | Approx. 0 V 5.35 V |
| 16 | 13 | - | 1 | Temperature signal from control unit | 9- 2 | Switch on ignition. While actuating btn 1: | 1.5...1.9 V |
| 17 | 14 | - | - | Consumption signal | 4- 2 | Start engine - idle: With regulation: | Voltage undefined Voltage change |

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

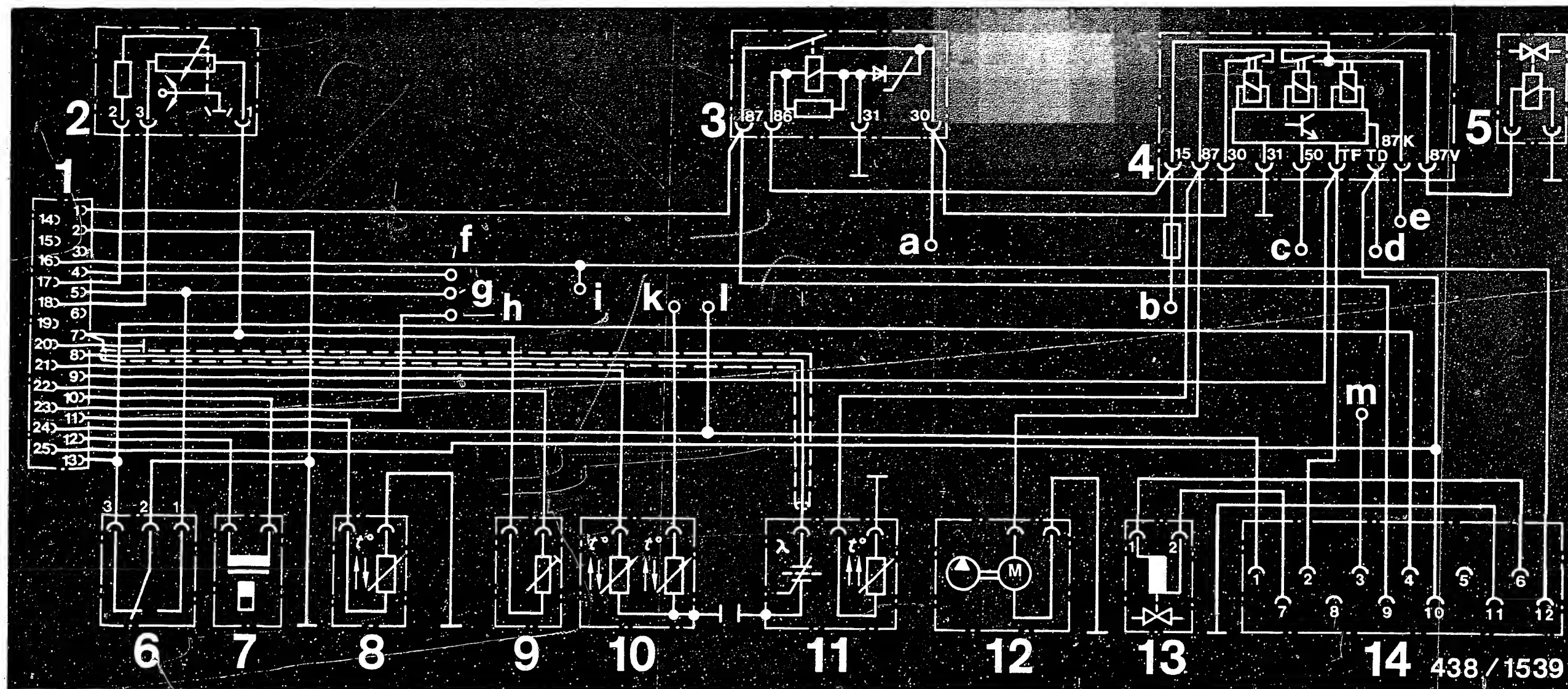
| No. | Switch/Btn | | | Under test | Test pins | Test conditions | Test specifications |
|-----|------------|----------|------|---|-----------|---|--|
| | V | Ω | Bt n | | | | |
| 18 | — | — | — | Peak coil current | 12-12 | Switch on ignition: | ->FD — : — mA FD 545->: 60...80 mA |
| 19 | — | 21 | 2 | Actuator current engine at normal operating temperature | 12-12 | Engine at normal operating temperature, idle. Current value with btn 2 depressed: | ->FD — : — mA FD 545->: 1...5 mA |
| 20 | — | 21 | 2 | Starting enrichment | 12-12 | So that engine fails to start: disconnect speed relay for electric fuel pump. Short-circuit ignition coil term. 4 to ground via resistance of at least 2 k Ω (e.g. with sleeve-type suppressor and spark gap). While btn 1 depressed, actuate starting motor. Current rise (max. 1 sec.) to: | ->FD — : — mA FD 545->: 80...110 mA |
| 21 | — | 21 | 1 | Acceleration enrichment | 12-12 | Engine at normal operating temperature, idle. While actuating btn 1, perform snap acceleration of engine. Thus current rise (approx. 1 s) to: Note: Level of current value dependent upon intensity of acceleration (travel/duration of air-flow sensor flap movement). | ->FD — : — mA FD 545->: 20...60 mA |

FD = Date of manufacture

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

| No. | Switch/Btn | | | Under test | Test pins | Test conditions | Test specifications |
|-----|------------|----|------|----------------------|-----------|--|--|
| | V | Ω | Bt n | | | | |
| 22 | - | - | - | Overrun cut-off | 12-12 | Re-connect ohmmeter (swap positive and negative). Start engine (normal op. temp.). Drive vehicle on vehicle-performance tester or road. Speed > 40 km/h. Engine speed ≥ 2500 min ⁻¹ . Vehicle in overrun. (Idle throttle-valve switch closed) Current reading: | -40...-80 mA |
| 23 | - | 21 | - | Full-load enrichment | 12-12 | Engine at normal operating temperature, idle. Current value: Briefly push accelerator pedal to floor (full-load throttle-valve switch must switch). During speed rise, current value rises by: A t t e n t i o n: Do this very briefly, so that speed does not rise too much and engine is not damaged. | ->FD — : — mA FD 545->: 1...5 mA ->FD — : — mA FD 545->: 3...6 mA |

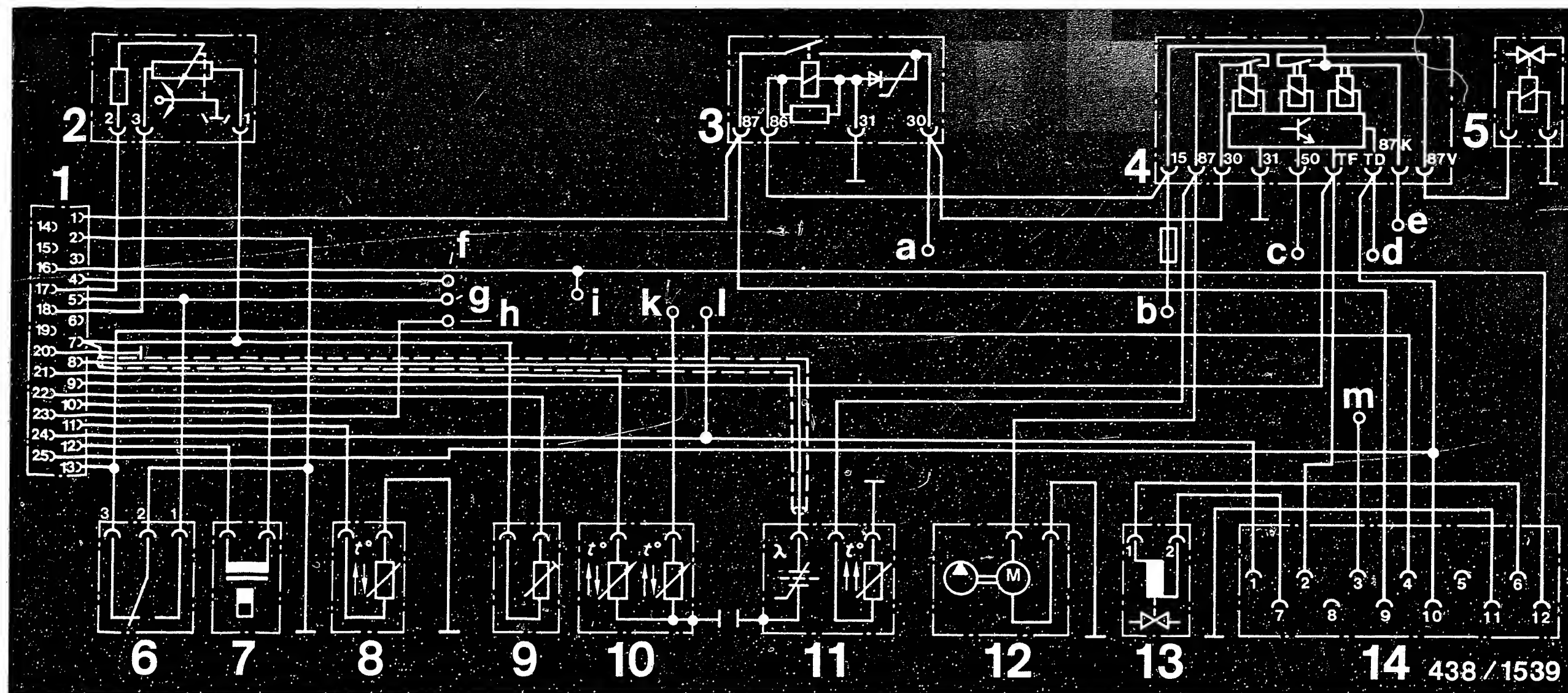
FD = Date of manufacture



- 1 = Control unit, KE-Jetronic
- 2 = Air-flow sensor potentiometer
- 3 = Over-voltage protection relay
- 4 = Electronic relay
- 5 = Cold-start valve
- 6 = Throttle-valve switch, idle/full load
- 7 = Electro-hydraulic pressure actuator
- 8 = Temperature sensor, intake air

- 9 = Trimming plug, mixture map
- 10 = Temperature sensor, engine (Double NTC)
- 11 = Heated lambda sensor
- 12 = Electric fuel pump
(2 pumps are installed, connected in parallel)
- 13 = Idle actuator (non-Bosch product)
- 14 = Control unit, low-idle-speed control
(non-Bosch product)

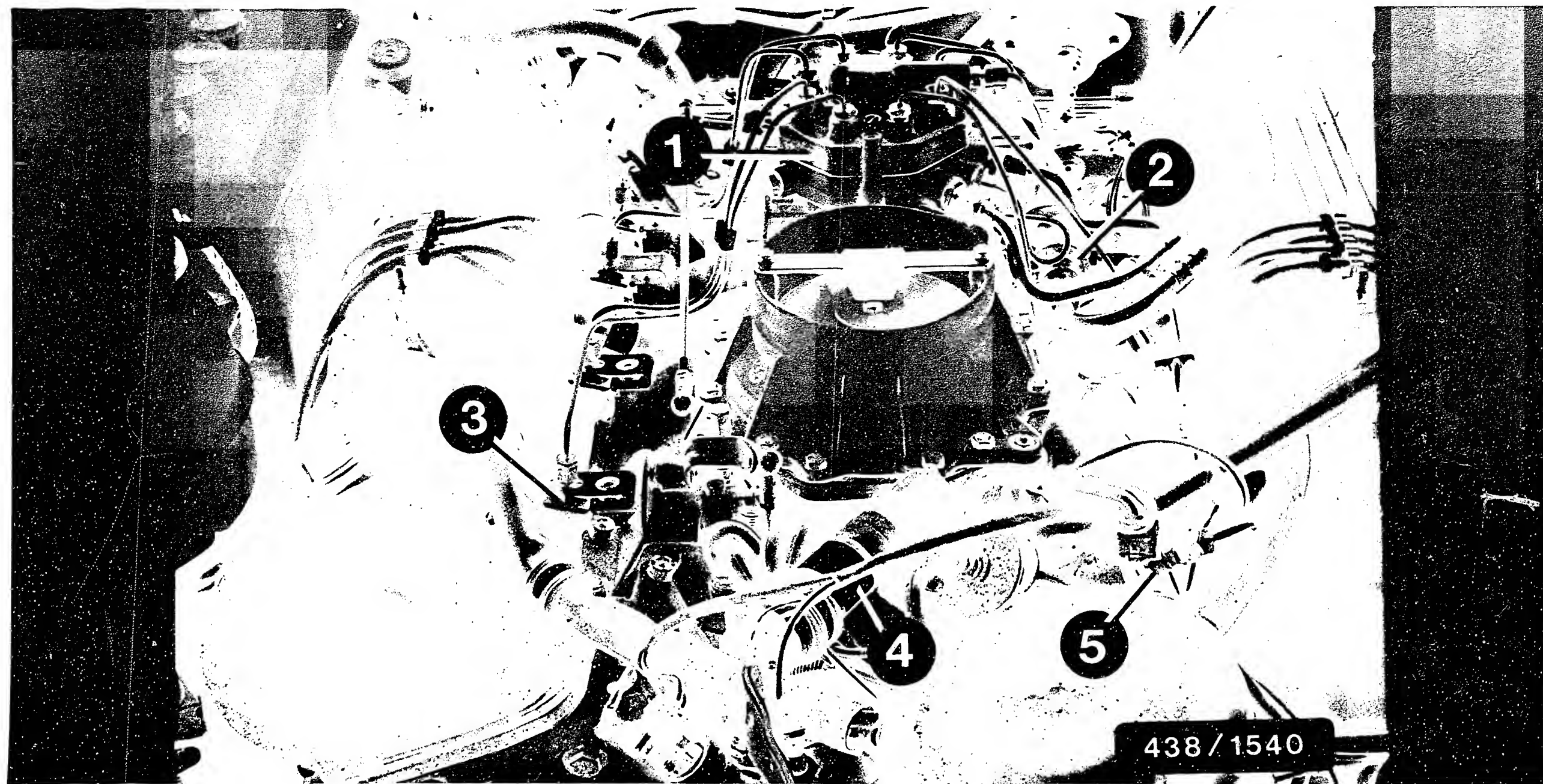
ELECTRICAL TERMINAL DIAGRAM WITH ELECTRIC FUEL PUMP SAFETY CIRCUIT



a = Terminal 30
 b = Terminal 15 (fuse 7)
 c = Plug connection, start-locking switch, socket 4
 d = Terminal TD, ignition
 e = Kick-down switch, socket 1
 f = Plug connection, trip computer

g = Trigger box, ignition system
 h = Lambda test output (diagnosis socket outlet, socket 3)
 i = Plug connection, start-locking switch, socket 3
 k = Trigger box, ignition system
 l = Speed signal
 m = Control unit, compressor cutoff

ELECTRICAL TERMINAL DIAGRAM WITH ELECTRIC FUEL PUMP SAFETY CIRCUIT (CONTINUED)



1 = Mixture-control unit
2 = Pressure regulator
3 = Injection valve

4 = Idle actuator (non-Bosch product)
5 = Cold-start valve

INSTALLATION POSITION OF COMPONENTS

INSTALLATION POSITION OF COMPONENTS
(CONTINUED)

- * KE-Jetronic control unit, mixture map
trimming plug:
In footwell on right behind side
panelling.
- * Relay, electric fuel pump:
In engine compartment on left.
- * Relay, over-voltage protection:
In engine compartment on left.
- * Temperature sensor, engine (NTC II):
On left, as seen from forward direction of
travel, at rear on cylinder head.

For production reasons:
continued on the following
coordinate.

TABLE OF CONTENTS

| | |
|---|---------------------|
| Trouble-shooting instructions | : MB-5013 |
| BOSCH system | : KE 3.1 - Jetronic |
| Vehicle make | : MERCEDES-BENZ |
| Basic microcard | : PKW-014 |
| | |
| Test instructions | Coordinates |
| | |
| Special features..... | J02 |
| Self-diagnosis/Rapid diagnosis chart..... | J07 - J18 |
| Test specifications..... | J03 - J06 |
| Electrical terminal diagram..... | J19 - J22 |
| Electrical wiring diagram..... | |
| Hydraulic-lines diagram..... | |
| Diagram of air/fuel lines..... | |
| Tools and test equipment..... | |
| Testing and adjustment instructions..... | |
| Installation position of components..... | J23 - J25 |
| Notes on removal and installation..... | |
| General important information..... | |

Tests without coordinate details are not applicable in these trouble-shooting instructions.

SPECIAL FEATURES

- * This microcard contains the trouble-shooting instructions, valid at the time of publication, for the following Mercedes-Benz model:

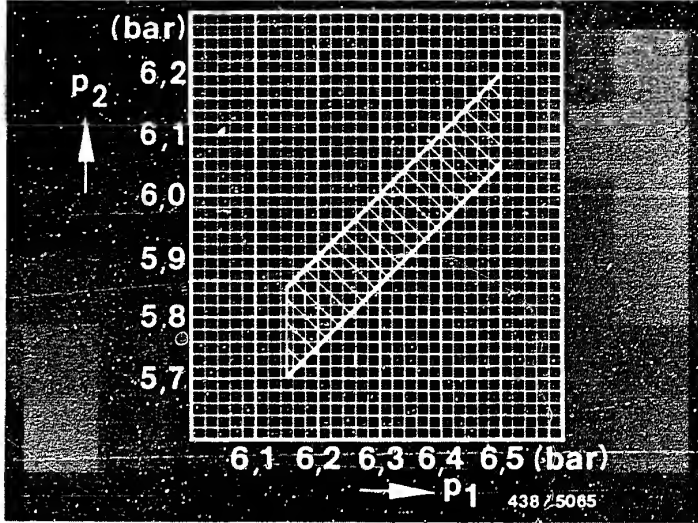
560 SEL/SEC/SL, 5,6l/8Zy1. US/J/AUS 09.85->
- * Trouble-shooting with these instructions may only then take place when the details of the "Summary - Service Information for Vehicles" (KFZ-000) coincide with those of the vehicle type and with the BOSCH number of KE-Jetronic control unit installed.
- * Control unit using digital techniques, characteristic-map control using microprocessor.
- * Electronically controlled low-idle-speed control with single-winding rotary actuator, without bypass adjusting screw.
- * Activated-carbon filter and regeneration valve for return of gasoline vapors into the intake manifold. (Fuel evaporation system)
- * Secondary-air injection

Important note:

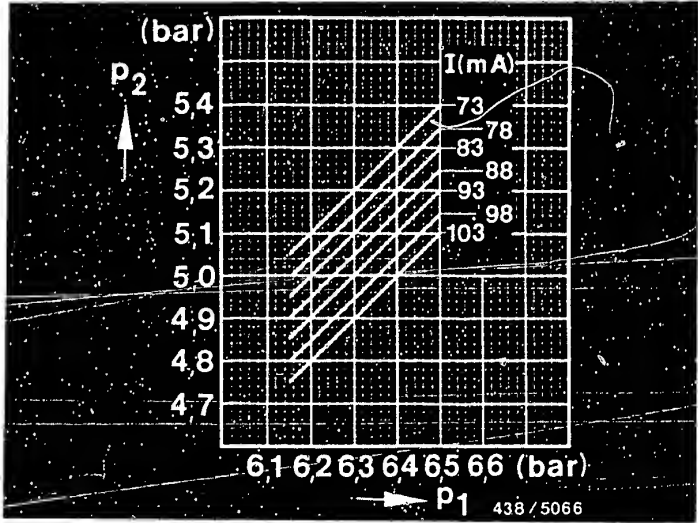
If reference is made to a basic microcard, always make certain you use the test specifications from the vehicle-specific brief instructions.

TEST SPECIFICATIONS

| No. | Testing/Test condition | Test specification | |
|-----|--|--|--|
| 1 | Electric fuel pump - fuel delivery: | At least 1750 cm ³ /min | |
| 2 | Primary pressure: | 6,15...6,5 bar | |
| 3 | Differential pressure: Suppression of peak coil current: Actuate starting motor with fuel-pump relay disconnected. <u>Do not</u> switch off ignition after starting. Take lower-chamber pressure set value "warm" from top chart corresponding to primary pressure measured. (Actuator current 0 mA) Take lower-chamber pressure set value "cold" from bottom chart corresponding to primary pressure measured and actuator current. Tolerance ± 0.15 bar. Simulation of "cold" state: press push-button 3 at test adapter. | | |
| 4 | Leakage test, complete system: Minimum pressure after 10 mins: Minimum pressure after 20 mins: | 3,3 bar 3,2 bar | |
| 5 | Injection valves, opening pressure: | 3,7...4,8 bar | |
| 6 | Fuel deliveries, comparative measurement: (Actuator current 0 mA) Idle: Part load: Full load: Min. delivery at max. air-flow sensor plate defl.: | Setting point: (cm ³ /min) 6,0 40,0 100,0 140,0 cm ³ /min | Max. permis. delivery: (cm ³ /min) 6,8 42,5 109,0 |



p₁ = Primary pressure
p₂ = Lower-chamber pressure



TEST SPECIFICATIONS (CONTINUED)

| No. | Testing/Test condition | Test specification |
|-----|---|--|
| 7 | Rate of flow, KE restriction: | 130...150 cm ³ /min |
| 8 | Temperature sensor, air (NTC I): Air temperature +15...+30°C: | — k Ω |
| 9 | Temperature sensor, engine (NTC II): Engine cold (+15...+30°C): Engine warm (approx. +80°C): | 1,3...3,6 k Ω 250...390 Ω |
| 10 | Idle-mixture-adjusting screw basic setting: Fuel-distributor seat - needle bearing: | 22,6...22,8 mm |
| 11 | <p>Idle adjustment:</p> <p>Low-idle-speed control (non-Bosch product). For testing, engine at norm. op. temperature</p> <p>Idle speed:</p> <p>Idle-actuator current at idle speed:</p> <p>Engage driving position, speed:</p> <p>Check lambda closed-loop control: Measurement with lambda closed-loop control tester (e.g. KDJE-P 600) and adapter lead (e.g. KDJE-P 600/52) at diagnosis socket outlet (pin 3). Alternatively: Current measurement using universal test adapter.</p> <p>Put fuel evaporation system out of operation.</p> <p>Determine on/off ratio (mean value) at $n = 2500 \text{ min}^{-1}$.</p> <p>Deviation of on/off ratio (mean value) at idle compared to $n = 2500 \text{ min}^{-1}$:</p> <p>Adjustment at idle-mixture-adjusting screw. After adjustment, repeat measurement.</p> | <p>600...700 min⁻¹</p> <p>700...1000 mA</p> <p>500...600 min⁻¹</p> <p>+5...+15 %</p> |

SELF-DIAGNOSIS

All Daimler-Benz 8-cylinder engines have been equipped as of FD 552 with self-diagnosis using on-off ratio measurement.

Defective input signals of the KE-Jetronic control unit may be indicated at the lambda test output (diagnosis socket outlet, socket 3) using the lambda closed-loop control tester.

Short circuiting and breaks in lines are detected. Sporadically occurring faults (e.g. loose contact) are not detected. Output of the fault signals takes priority over output of the lambda closed-loop control signal.

The faults which can be indicated are not discussed in detail here, since the input signals of the KE-Jetronic control unit may be tested using the universal test adapter (rapid diagnosis chart).

However, should a constant on-off ratio be indicated when testing the lambda closed-loop control using on-off ratio measurement, the input signals of the KE-Jetronic control unit must be checked (rapid diagnosis chart).

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER
ETT 018.01 WITH KE3 ADAPTER LEAD
1 684 463 169 AND APPROPRIATE MULTITESTER:

The following rapid diagnosis chart makes it possible for the experienced Jetronic expert to quickly check the electric/electronic peripheral and control-unit functions of the KE-Jetronic, including the lambda closed-loop control.

Important note on the rapid diagnosis chart:

The "Test conditions" column gives information as to in which test steps the control-unit plug must be connected/disconnected. Make absolutely certain that there is no current at the system when connecting or disconnecting, i.e. the ignition must be switched off and the electric safety circuit must not be short circuited.

The "Test connections" column provides information about the leads connected to the respective measuring path, referring to the assignment in the control-unit plug. Possibly necessary trouble-shooting is with regard to these leads.

A t t e n t i o n :

When carrying out the test, make sure that the trimming plug is in position 1.

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

| No. | Switch/Btn V Ω Btn | Under test | Test pins | Test conditions | Test specifications |
|-----|-----------------------------|---|--------------|--|--|
| 1 | V | 4 - Internal resistance (R _i) pressure actuator | 12-10 | Disconnect control-unit plug. | 20...30 Ω |
| 2 | V | 5 - Resistance NTC II (engine) | 21- 2 | Engine temperature +15...+30°C; approx. +80°C: | 1,3...3,6 k Ω 250...390 Ω |
| 3 | | Resistance NTC I (intake air) | | Air temperature in area of NTC I = +15...+30°C: | Test step not applicable |
| 4 | V | 6 - Signal, altitude sensor | 11- 2 | Connect control unit. Switch on ignition. Voltmeter connection to blue Ω -sockets. Signal altitude-dependent: 0 meters (sea level): 500 meters: 1000 meters: 1500 meters: 2000 meters: 3000 meters: | 3,2...4,5 V 2,8...4,0 V 2,4...3,5 V 2,0...3,0 V 1,5...2,5 V 0,8...1,6 V |
| 5 | V | 9 - Throttle-valve switch, idle | 13- 2 | Switch off ignition. Disconnect control-unit lead plug. Throttle valve closed: open: | 0...10 Ω > 1000 Ω |
| 6 | V | 10 - Throttle-valve switch, full load | 5- 2 | Throttle valve closed: fully open: | > 5000 Ω 0...10 Ω |
| 7 | V | 11 - Microswitch idle linkage | 24- 2 | Throttle valve closed: open: | — Ω infinite Ω |
| 8 | V | 12 - Ground, control unit | 20- 2 | | 0...10 Ω |
| 9 | V | 13 - Ground, pin 7 | 7- 2 | Switch off ignition. Connect control unit. | 0...10 Ω |

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

| No. | Switch/Btn V | Ω | Bt n | Under test | Test pins | Test conditions | Test specifications |
|-----|-----------------|----------|---------|---|--------------|---|---|
| 10 | V | 14 | - | Trimming plug mixture map | 22- 2 | Disconnect control-unit plug. Disconnect lead plug from air-flow sensor potentiometer and connect socket 1 of plug (in upper installation position) to engine ground. Trimming-plug position 1: 2: 3: 4: 5: 6: 7: | 0...10 Ω _____ Ω _____ Ω _____ Ω _____ Ω _____ Ω _____ Ω |
| 11 | V | 15 | - | Transmission switch (automatic trans- mission only) | 16- 2 | Connect air-flow sensor potentiometer. Selection lever in position P, N: Driving position selected: | 0...10 Ω > 3000 Ω |
| 12 | 5 | - | - | TD signal | 25- 2 | Start engine (starting motor): | Voltage undefined |
| 13 | 6 | - | - | Control-unit supply | 1- 2 | Switch on ignition: | 8...15 V |
| 14 | 10 | - | - | Supply, air-flow sensor potentiometer | 18- 2 | Switch off ignition. Connect control unit. Switch on ignition: | 4.35...5.35 V |
| 15 | 11 | - | - | Signal, air-flow sensor potentiometer | 17- 2 | Switch on ignition. Air-flow sensor plate in neutral position: Deflect air-flow sensor plate by hand, continuous voltage rise up to max.: | Approx. 0 V 5.35 V |
| 16 | 13 | - | 1 | Temperature signal from control unit | 9- 2 | Switch on ignition. While actuating btn 1: | 1.5...1.9 V |
| 17 | 14 | - | - | Consumption signal | 4- 2 | Start engine - idle: With regulation: | Voltage undefined Voltage change |

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

| No. | Switch/ V | Btn Ω | Under test | Test pins | Test conditions | Test specifications |
|-----|--------------|-----------------|------------|--|-----------------|---|
| 18 | - | - | - | Peak coil current | 12-12 | Switch on ignition: ->FD _____ : _____ mA FD 545->: 65...85 mA |
| 19 | - | 21 | 2 | Actuator current engine at normal operating temperature | 12-12 | Engine at normal operating temperature, idle. Current value with btn 2 depressed: ->FD _____ : _____ mA FD 545->: -1...+1 mA |
| 20 | - | 21 | 2 | Starting enrichment | 12-12 | So that engine fails to start: disconnect speed relay for electric fuel pump. Short-circuit ignition coil term. 4 to ground via resistance of at least 2 k Ω (e.g. with sleeve-type suppressor and spark gap). While btn 1 depressed, actuate starting motor. Current rise (max. 1 sec.) to: ->FD _____ : _____ mA FD 545->: 80...110 mA |
| 21 | - | 21 | 1 | Acceleration enrichment | 12-12 | Engine at normal operating temperature, idle. While actuating btn 1, perform snap acceleration of engine. Thus current rise (approx. 1 s) to: ->FD _____ : _____ mA FD 545->: 20...60 mA Note: Level of current value dependent upon intensity of acceleration (travel/duration of air-flow sensor flap movement). |

FD = Date of manufacture

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

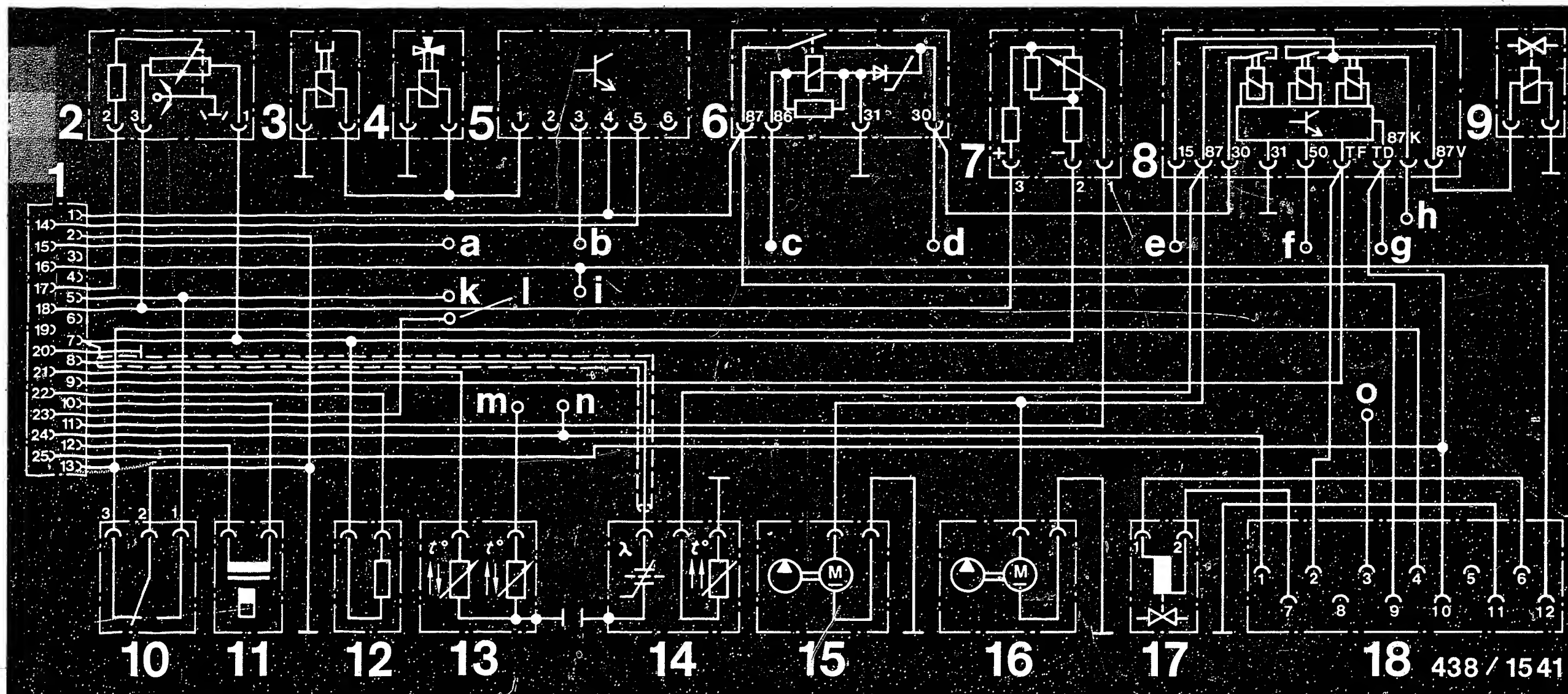
| No. | Switch/ V | Btn Ω | Under test | Test pins | Test conditions | Test specifications |
|-----|--------------|-----------------|------------|--------------|--|---|
| 22 | - | - | - | 12-12 | Re-connect ohmmeter (swap positive and negative). Start engine (normal op. temp.). Drive vehicle on vehicle-performance tester or road. Speed > 40 km/h. Engine speed $\geq 2500 \text{ min}^{-1}$. Vehicle in overrun. (Idle throttle-valve switch closed) Current reading: | -40...-80 mA |
| 23 | - | 21 | - | 12-12 | Engine at normal operating temperature, idle. Current value: Briefly push accelerator pedal to floor (full-load throttle-valve switch must switch). During speed rise, current value rises by: A t t e n t i o n: Do this very briefly, so that speed does not rise too much and engine is not damaged. | ->FD — : — mA FD 545->: -1...+1 mA ->FD —, 9 : — mA FD 545->: 3...6 mA |

FD = Date of manufacture

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

| No. | Switch/Btn | | | Under test | Test pins | Test conditions | Test specifications |
|-----|------------|----------|------|---|-----------|--|------------------------|
| | V | Ω | Bt n | | | | CAT |
| 24 | - | 24 | - | Lambda closed-loop control, closed-loop control operation | 12-12 | Disconnect regeneration lead to venturi assembly at regeneration valve and seal off. Engine at normal operating temperature, idle. Closed-loop control operation can be recognised from the oscillating current reading. Mean value: If mean value outside tolerance, set (idle-mixture-adjusting screw) to approx.: | -2...+2 mA 0 mA |
| 25 | - | 22 | - | Lambda closed-loop control, rich stop | 12-12 | Engine at normal operating temperature, idle. Current rise to: | 10...14 mA |
| 26 | - | 23 | - | Lambda closed-loop control, lean stop | 12-12 | Engine at normal operating temperature, idle. Current drop to: | -8...-12 mA |

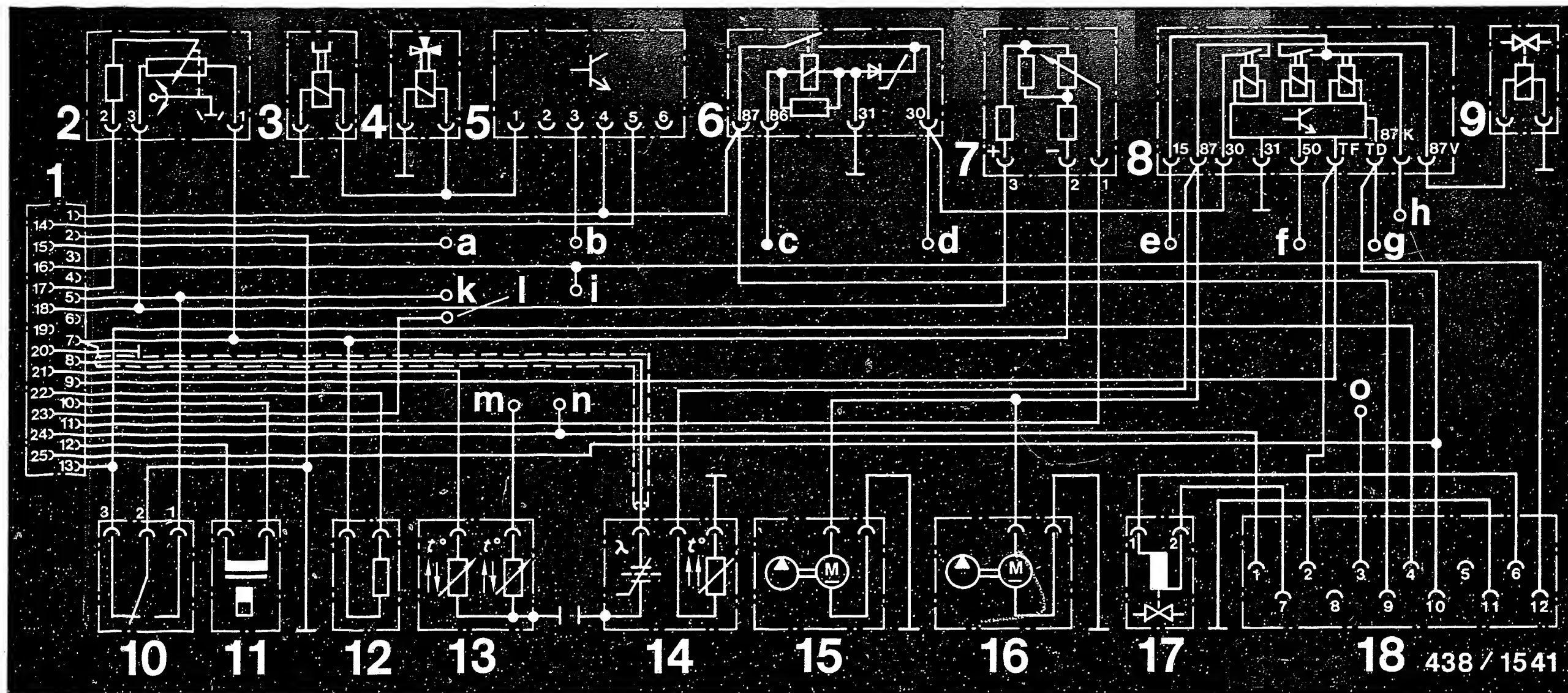
FD = Date of manufacture



- 1 = Control unit, KE-Jetronic
- 2 = Air-flow sensor potentiometer
- 3 = Electro-magnetic coupling, air pump
- 4 = Change-over valve, air pump
- 5 = Relay, air injection
- 6 = Over-voltage protection relay
- 7 = Altitude sensor
- 8 = Electronic relay
- 9 = Cold-start valve

- 10 = Throttle-valve switch, idle/full load
- 11 = Electro-hydraulic pressure actuator
- 12 = Trimmer resistor, mixture map
- 13 = Temperature sensor, coolant (Double NTC)
- 14 = Heated lambda sensor
- 15 = Electric fuel pump
- 16 = Electric fuel pump
- 17 = Idle actuator (non-Bosch product)
- 18 = Control unit, low-idle-speed control (non-Bosch product)

ELECTRICAL TERMINAL DIAGRAM WITH ELECTRIC FUEL PUMP SAFETY CIRCUIT



a = Lambda malfunction indicator

b = Terminal 15

c = Terminal 15

d = Terminal 30

e = Terminal 15

f = Plug connection, start-locking switch, socket 4

g = Terminal TD, ignition

h = Kick-down switch, socket 1

i = Plug connection, start-locking switch, socket 3

k = Trigger box, ignition system

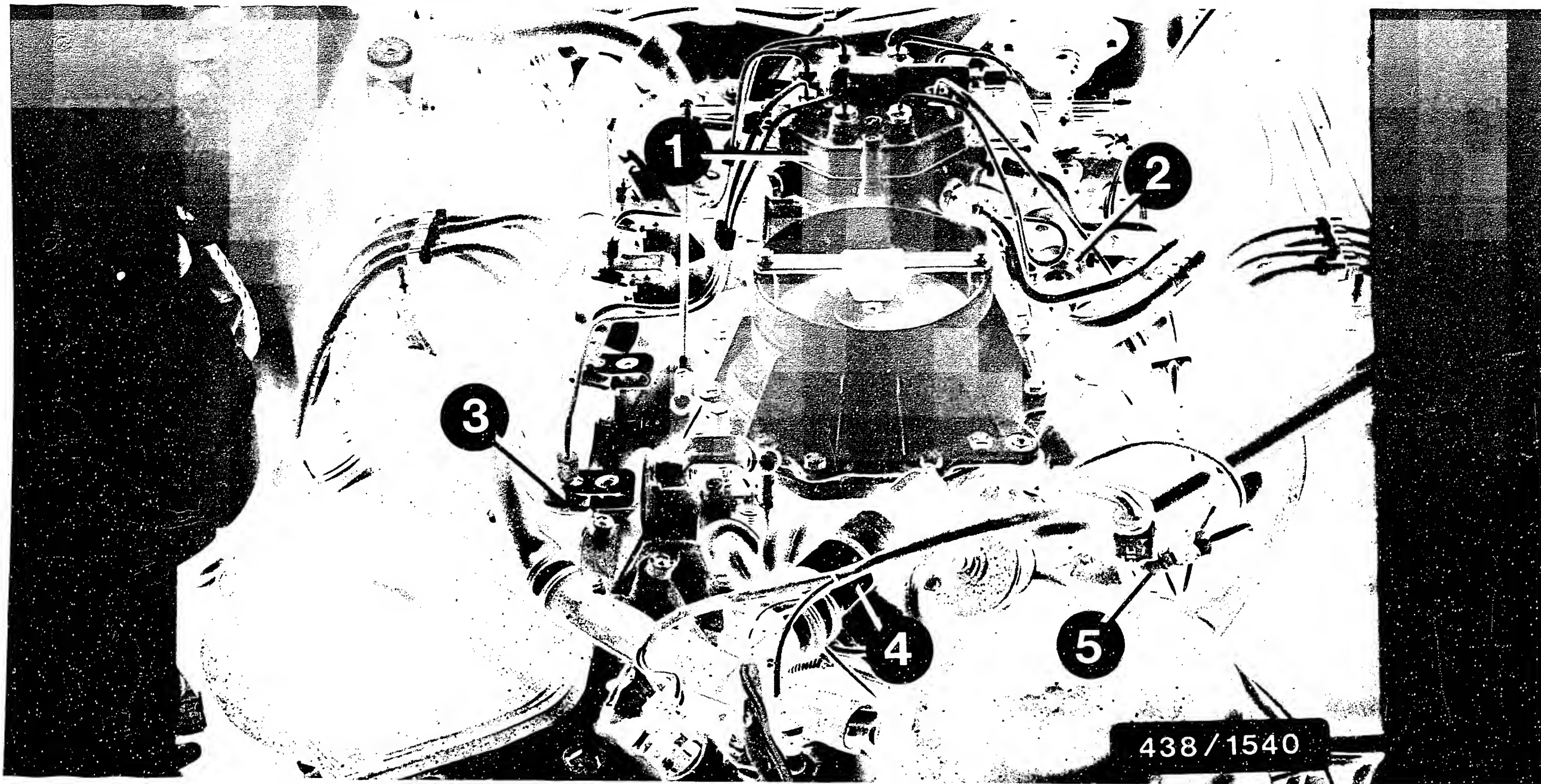
l = Lambda test output (diagnosis socket outlet, socket 3)

m = Trigger box, ignition system

n = Speed signal

o = Control unit, compressor cutoff

Electrical terminal diagram with electric fuel pump safety circuit (continued)



1 = Mixture-control unit
2 = Pressure regulator
3 = Injection valve

4 = Idle actuator (non-Bosch product)
5 = Cold-start valve

INSTALLATION POSITION OF COMPONENTS

INSTALLATION POSITION OF COMPONENTS (CONTINUED)

KE-Jetronic control unit:

In Type 126, in footwell at right behind side panel,
in Type 107, in footwell at right beneath floor panel.

Relay, electric fuel pump:

In Type 126, in engine compartment at left,
in Type 107, behind glove compartment.

Relay, over-voltage protection:

In Type 126, in engine compartment at left,
in Type 107, in footwell at right behind side panel.

Temperature sensor, engine (NTC II):

At left (referring to forward direction of travel) at rear at cylinder head.

For production reasons:
continued on the following
coordinate.

TABLE OF CONTENTS

| | | |
|---|---|-----------------|
| Trouble-shooting instructions | : | MB-5014 |
| BOSCH system | : | KE 3.1-Jetronic |
| Vehicle make | : | MERCEDES-BENZ |
| Basic microcard | : | PKW-014 |
| | | |
| Test instructions | | Coordinates |
| <hr/> | | |
| Special features..... | | K02 |
| Self-diagnosis/Rapid diagnosis chart..... | | K07 - K18 |
| Test specifications..... | | K03 - K06 |
| Electrical terminal diagram..... | | K19 - K22 |
| Electrical wiring diagram..... | | |
| Hydraulic-lines diagram..... | | |
| Diagram of air/fuel lines..... | | |
| Tools and test equipment..... | | |
| Testing and adjustment instructions..... | | |
| Installation position of components..... | | K23 - K26 |
| Notes on removal and installation..... | | |
| General important information..... | | |

Tests without coordinate details are not applicable in these trouble-shooting instructions.

SPECIAL FEATURES

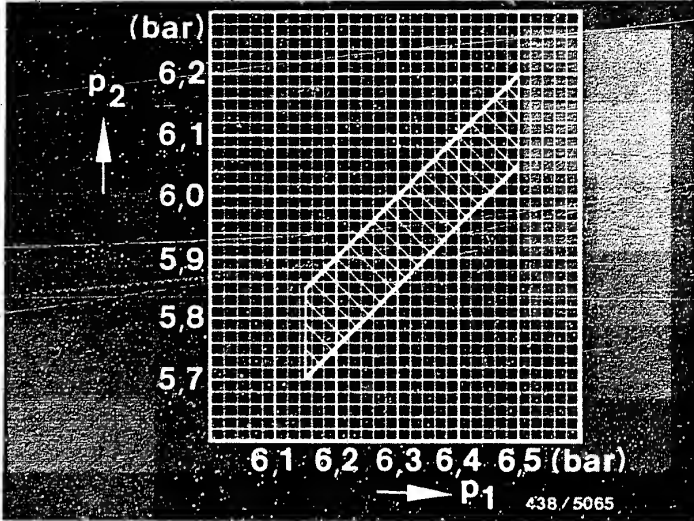
These instructions contain the KE 3.1-Jetronic trouble-shooting instructions, valid at the time of publication, for the following Mercedes-Benz models:

MERCEDES-BENZ
420 SE/SEL/SEC, 4,2 l/8Zyl. 09.85->
420 SL, 4,2 l/8Zyl. 01.86->

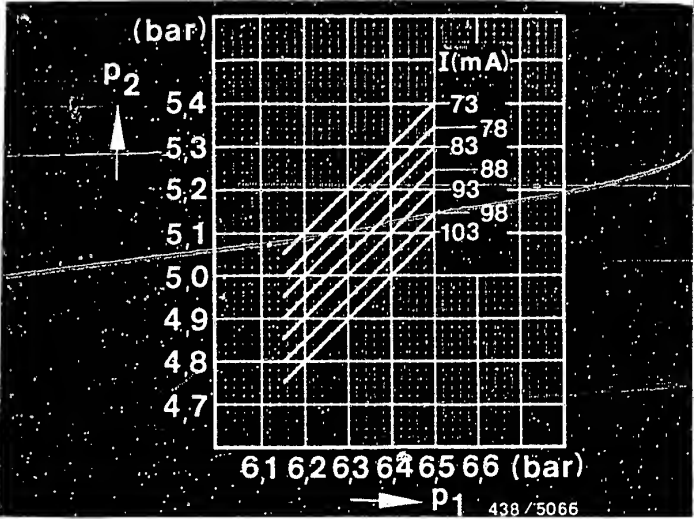
- Trouble-shooting with these instructions may only then take place when the details of the "Summary - Service Information for Vehicles" (KFZ-000) coincide with those of the vehicle type and with the BOSCH number of the KE-Jetronic control unit installed.
- Control unit using digital techniques, characteristic-map control using microprocessor.
- Multi-functional fuel-management system with a characteristic map for operation with lambda closed-loop control (CAT) and a characteristic map for operation without lambda closed-loop control (ECE). Activation of the characteristic maps by trimming plug with corresponding marking. To set to the fuel grades unleaded regular and unleaded premium, only the ignition trimming plug must be reconnected.
- Electronically controlled idle-speed control with single-winding rotary actuator, without bypass adjusting screw.
- Activated-carbon filter and regeneration valve for return of gasoline vapors into the intake manifold. (Fuel evaporation system)
- Secondary air injection (in CAT version only)

TEST SPECIFICATIONS

| No. | Testing/Test condition | Test specification | |
|-----|--|--|--|
| 1 | Electric fuel pump – fuel delivery: | At least 1650 cm ³ /min | |
| 2 | Primary pressure: | 6,15...6,5 bar | |
| 3 | Differential pressure: Suppression of peak coil current: Actuate starting motor with fuel-pump relay disconnected. <u>Do not</u> switch off ignition after starting. Take lower-chamber pressure set value "warm" from top chart corresponding to primary pressure measured. (Actuator current 0 mA) Take lower-chamber pressure set value "cold" from bottom chart corresponding to primary pressure measured and actuator current. Tolerance ± 0.15 bar. Simulation of "cold" state: press push-button 3 at test adapter. | | |
| 4 | Leakage test, complete system: Minimum pressure after 10 mins: Minimum pressure after 20 mins: | 3,3 bar 3,2 bar | |
| 5 | Injection valves, opening pressure: | 3,7...4,8 bar | |
| 6 | Fuel deliveries, comparative measurement: (Actuator current 0 mA) Idle: Part load: Full load: Min. delivery at max. air-flow sensor plate defl.: | Setting point: (cm ³ /min) 6,0 40,0 100,0 140 cm ³ /min | Max. permis. delivery: (cm ³ /min) 6,6 42,5 109,0 |



p 1 = Primary pressure
p 2 = Lower-chamber pressure



TEST SPECIFICATIONS (CONTINUED)

[illegible]

SELF-DIAGNOSIS

All Daimler-Benz 8-cylinder engines have been equipped as of FD 552 with self-diagnosis using on-off ratio measurement.

Defective input signals of the KE-Jetronic control unit may be indicated at the lambda test output (diagnosis socket outlet, socket 3) using the lambda closed-loop control tester.

Short circuiting and breaks in lines are detected. Sporadically occurring faults (e.g. loose contact) are not detected. Output of the fault signals takes priority over output of the lambda closed-loop control signal.

The faults which can be indicated are not discussed in detail here, since the input signals of the KE-Jetronic control unit may be tested using the universal test adapter (rapid diagnosis chart).

However, should a constant on-off ratio be indicated when testing the lambda closed-loop control using on-off ratio measurement, the input signals of the KE-Jetronic control unit must be checked (rapid diagnosis chart).

RAPID DIAGNOSIS CHART TO UNIVERSAL TEST ADAPTER ETT 018.01 WITH KE3 ADAPTER LEAD 1 684 463 169 AND APPROPRIATE MULTITESTER:

The following rapid diagnosis chart makes it possible for the experienced Jetronic expert to quickly check the electric/electronic peripheral and control-unit functions of the KE-Jetronic, including the lambda closed-loop control.

Important note on the rapid diagnosis chart:

The "Test conditions" column gives information as to in which test steps the control-unit plug must be connected/disconnected. Make absolutely certain that there is no current at the system when connecting or disconnecting, i.e. the ignition must be switched off and the electric safety circuit must not be short circuited.

The "Test connections" column provides information about the leads connected to the respective measuring path, referring to the assignment in the control-unit plug. Possibly necessary trouble-shooting is with regard to these leads.

The "Test specifications" column contains the test specifications for both the version without lambda closed-loop control (ECE, left-hand test-specifications column) and for the version with lambda closed-loop control (CAT, right-hand test-specifications column).

Before starting testing, determine which version is being tested. If only one test specification is given, this applies to both versions.

Attention: When carrying out the test, make sure that the trimming plug is in position 1.

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

| No. | Switch/Btn V Ω Bt n | Under test | Test pins | Test conditions | Test specifications |
|-----|---------------------------------|---|--------------|---|-----------------------------|
| 1 | V | 4 - Int. resistance(R _i) pressure actuator | 12-10 | Disconnect control-unit lead plug. | 20...30 Ω |
| 2 | V | 5 - Resistor NTC II (engine) | 21- 2 | Engine temperature +15°...+30° C; approx. +80° C: | 1,3...3,6k Ω 250...390 Ω |
| 3 | V | 6 - Resistor NTC I (intake air) | 11- 2 | Air temperature in area of NTC I: +15°...+30° C: | 1,3...3,6k Ω |
| 4 | | Signal, altitude sensor | | Connect control unit. Switch on ignition. Voltmeter connection to blue Ω sockets. Signal altitude-dependent: 0 meters (sea level): 500 meters: 1000 meters: 1500 meters: 2000 meters: 3000 meters: | Test step not applicable! |
| 5 | V | 9 - Throttle-valve switch, idle | 13- 2 | Switch off ignition. Disconnect control-unit lead plug. Throttle valve closed: open: | 0...10 Ω > 1000 Ω |
| 6 | V | 10 - Throttle-valve switch, full load | 5- 2 | Throttle valve closed: fully open: | > 5000 Ω 0...10 Ω |
| 7 | V | 11 - Microswitch idle linkage | 24- 2 | Throttle valve closed: open: | — Ω infinite Ω |
| 8 | V | 12 - Ground, control unit | 20- 2 | | 0...10 Ω |
| 9 | V | 13 - Ground, pin 7 | 7- 2 | Switch off ignition. Connect control unit. | 0...10 Ω |

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

| No. | Switch/Btn | | | Under test | Test pins | Test conditions | Test specifications | |
|-----|------------|----------|------|---|-----------|--|--|---|
| | V | Ω | Bt n | | | | ECE | CAT |
| 10 | V | 14 | — | Trimming plug mixture map | 22- 2 | Disconnect control-unit plug. Disconnect lead plug from air-flow sensor potentiometer and connect socket 1 of plug (in upper installation position) to engine ground. Trimming-plug position | 1: 50... 60 Ω 2: 100...120 Ω 3: 150...190 Ω 4: 230...270 Ω 5: 330...370 Ω 6: 430...470 Ω 7: 570...620 Ω | 900... 1020 Ω 1200... 1350 Ω 1500... 1350 Ω 2000... 2400 Ω 3000... 3600 Ω 5000... 5600 Ω 11000...12000 Ω |
| 11 | V | 15 | — | Transmission switch (automatic transmission only) | 16- 2 | Connect air-flow sensor potentiometer. Selection lever position P,N: Driving position selected: | 0...10 Ω > 3000 Ω | |
| 12 | 5 | — | — | TD signal | 25- 2 | Start engine (starting motor): | Voltage undefined | |
| 13 | 6 | — | — | Control-unit supply. | 1- 2 | Switch on ignition: | 8...15 V | |
| 14 | 10 | — | — | Supply, air-flow sensor potentiometer | 18- 2 | Switch off ignition. Connect control unit. Switch on ignition: | 4.35...5.35 V | |
| 15 | 11 | — | — | Signal, air-flow sensor potentiometer | 17- 2 | Switch on ignition. Air-flow sensor plate in neutral pos.: Deflect air-flow sensor plate by hand, continuous voltage rise up to max.: | approx. 0 V 5.35 V | |
| 16 | 13 | — | 1 | Temperature signal from control unit | 9- 2 | Switch on ignition. While actuating btn 1: | 1.5...1.9 V | |
| 17 | 14 | — | — | Consumption signal | 4- 2 | Start engine - idle: With regulation: | Voltage undefined Voltage change | |

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

| No. | Switch/Btn | | | Under test | Test pins | Test conditions | Test specifications | |
|-----|------------|----------|------|--|-----------|---|--|--|
| | V | Ω | Bt n | | | | ECE | CAT |
| 18 | - | - | - | Peak coil current | 12-12 | Switch on ignition: | ->FD _____ : _____ mA FD 546->: 60...80 mA | ->FD _____ : _____ mA FD 546->: 65...85 mA |
| 19 | - | 21 | 2 | Actuator current Engine at normal operating temp. | 12-12 | Engine at normal operating temp, idle. Current value with btn 2 pressed: | ->FD _____ : _____ mA FD 546->: 2...4 mA | ->FD _____ : _____ mA FD 546->: -1...+1 mA |
| 20 | - | 21 | 2 | Starting enrichment | 12-12 | So that engine fails to start: disconnect speed relay for electric fuel pump. Short circuit ignition coil term. 4 to ground via resistance of at least 2k Ω . (E.g. with sleeve-type suppressor and spark gap). While btn 1 pressed, actuate starting motor. Current rise (max. 1 sec.) to: | ->FD _____ : _____ mA FD 546->: 80...110 mA | ->FD _____ : _____ mA FD 546->: 80...110 mA |

FD = Date of manufacture

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

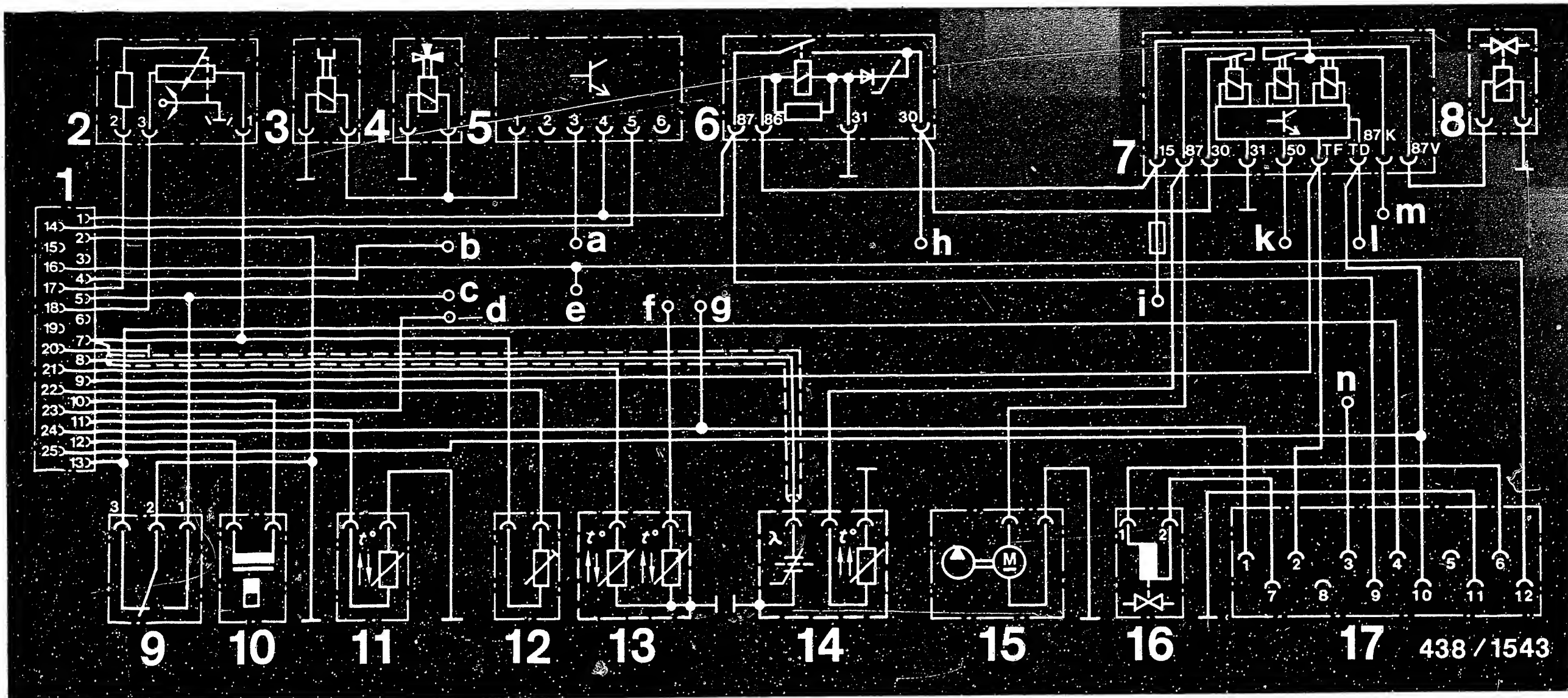
| No. | Switch/ V | Btn Ω | Bt n | Under test | Test pins | Test conditions | Test specifications | |
|-----|--------------|-----------------|---------|-------------------------|--------------|--|---|---|
| | | | | | | | ECE | CAT |
| 21 | - | 21 | 1 | Acceleration enrichment | 12-12 | Engine at norm. op. temp., idle. While actuating btn 1, perform snap acceleration of engine. Thus current rise (approx. 1 s.) to: <u>Note:</u> Level of current value dependent upon intensity of acceleration (travel/duration of air-flow sensor plate movement). | ->FD _____ : _____ mA FD 546->: 20...60 mA | ->FD _____ : _____ mA FD 546->: 20...50 mA |
| 22 | - | - | - | Overrun cut-off | 12-12 | Re-connect ohmmeter (positive and negative). Drive vehicle on chassis dynamometer or road. Speed > 40 km/h. Eng. speed n > 2500 min ⁻¹ . Vehicle in overrun (idle throttle-valve switch closed). Current reading: | -40...-80 mA | -40...-80 mA |

FD = Date of manufacture

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

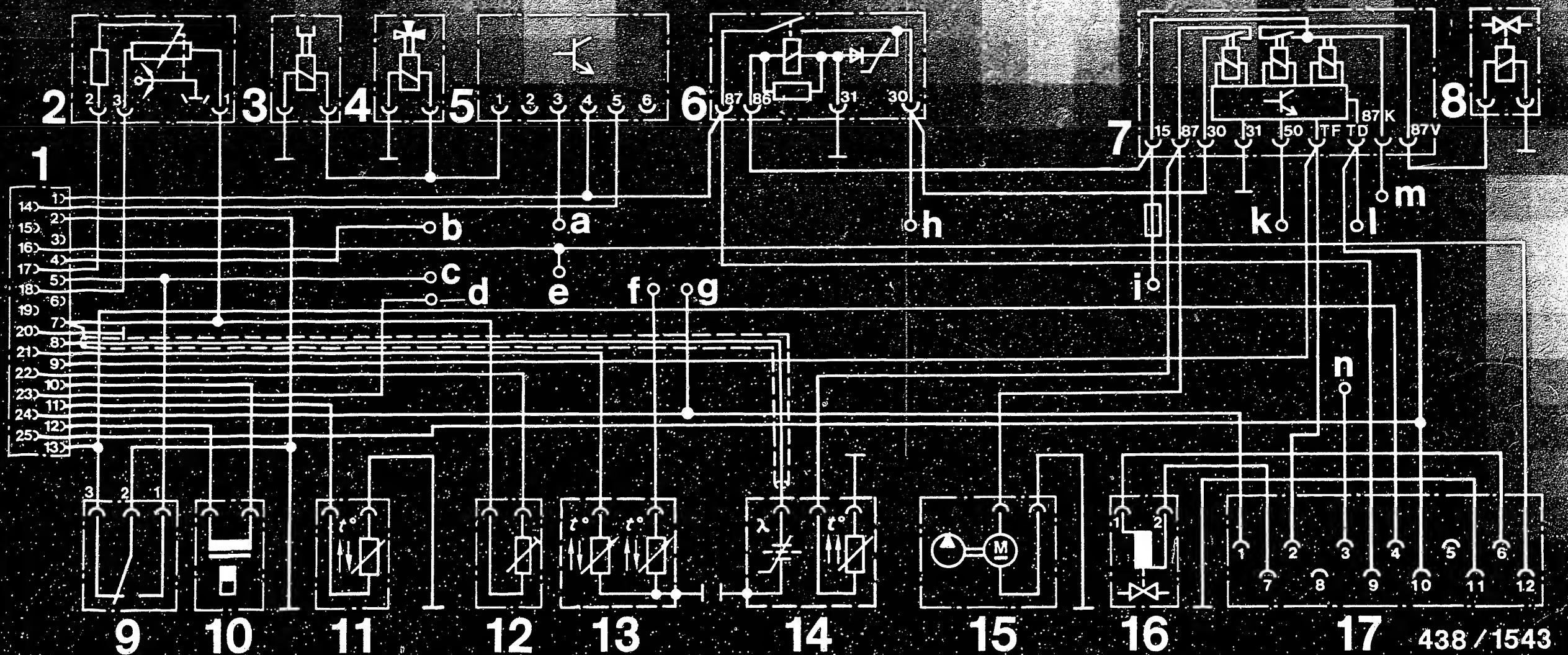
| No. | Switch/btn | | | Under test | Test pins | Test conditions | Test specifications | |
|-----|------------|----------|------|---|-----------|---|--|--|
| | V | Ω | Bt n | | | | ECE | CAT |
| 23 | — | 21 | — | Full-load enrichment | 12-12 | <p>Engine at normal operating temp., idle. Current value:</p> <p>Briefly push accelerator pedal to floor (full-load throttle-valve switch must switch). During speed rise, current value rises by:</p> <p><u>Attention:</u> Do this very briefly, so that speed does not rise too much and engine is not damaged.</p> | <p>→FD — : — mA FD 546→: 2...4 mA</p> <p>→FD — : — mA FD 546→: 3... 6 mA</p> | <p>→FD — : — mA FD 546→: -1...+1 mA</p> <p>→FD — : — mA FD 546→: 3... 6 mA</p> |
| 24 | — | 24 | — | Lambda closed-loop control, closed-loop control operation | 12-12 | <p>Disconnect regeneration lead to throttle-valve assembly from regeneration valve and seal off.</p> <p>Engine at norm. op. temp., idle. Closed-loop control operation can be recognized from the oscillating current reading. Mean value:</p> <p>If mean value outside tolerance, set (idle-mixture-adjusting screw) to:</p> | <p>—</p> <p>—</p> | <p>-2...+2 mA</p> <p>approx. 0 mA</p> |
| 25 | — | 22 | — | Lambda closed-loop control, rich stop | 12-12 | Engine at norm. op. temp., idle. Current rise to: | — | 10...14 mA |
| 26 | — | 23 | — | Lambda closed-loop control, lean stop | 12-12 | Engine at norm. op. temp., idle. Current drop to: | — | -8...-12 mA |

FD = Date of manufacture



- | | |
|--|--|
| 1 = Control unit, KE-Jetronic | 10 = Electro-hydraulic pressure actuator |
| 2 = Air-flow sensor potentiometer | 11 = Temperature sensor, intake air |
| 3 = Electro-magnetic coupling, air pump (CAT only) | 12 = Trimming plug, mixture map |
| 4 = Change-over valve, air pump (CAT only) | 13 = Temperature sensor, engine (double NTC) |
| 5 = Relay, air injection (CAT only) | 14 = Heated lambda sensor |
| 6 = Overvoltage-protection relay | 15 = Electric fuel pump (2 pumps are installed connected in parallel) |
| 7 = Electronic relay | 16 = Idle actuator (non-Bosch product) |
| 8 = Cold-start valve | 17 = Control unit, low-idle-speed control (non-Bosch product) |
| 9 = Throttle-valve switch, idle/full load | |

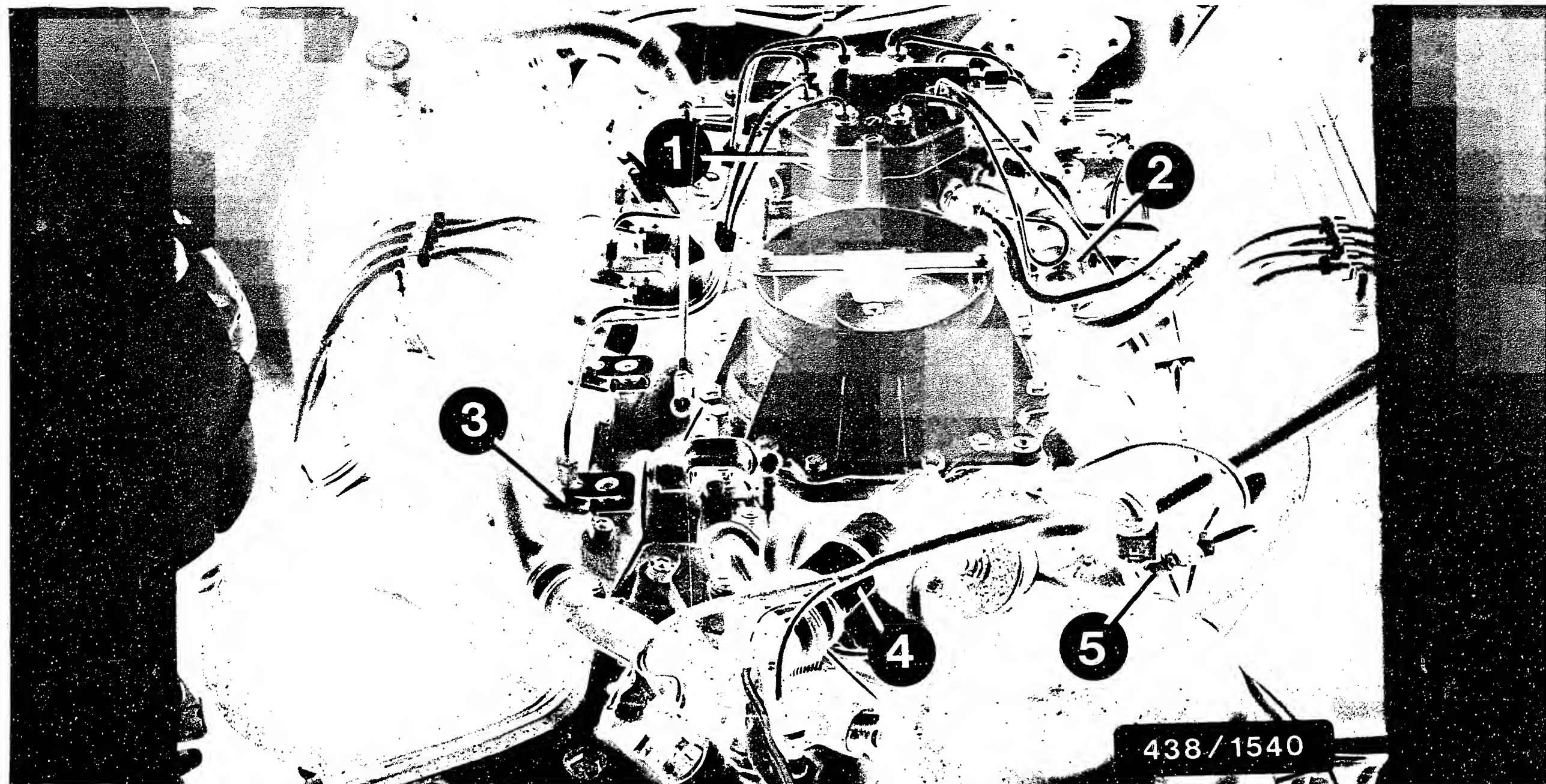
ELECTRICAL TERMINAL DIAGRAM WITH ELECTRIC FUEL PUMP SAFETY CIRCUIT



a = Terminal 15
 b = Plug connection, trip computer
 c = Trigger box, ignition system
 d = Lambda test output (diagnosis socket outlet, socket 3)
 e = Plug connection, start-locking switch, socket 3
 f = Trigger box, ignition system
 g = Speed signal

h = Terminal 30
 i = Terminal 15 (fuse 7)
 k = Plug connection, start-locking switch, socket 4
 l = Terminal TD, ignition
 m = Kick-down switch, socket 1
 n = Control unit, compressor cutoff

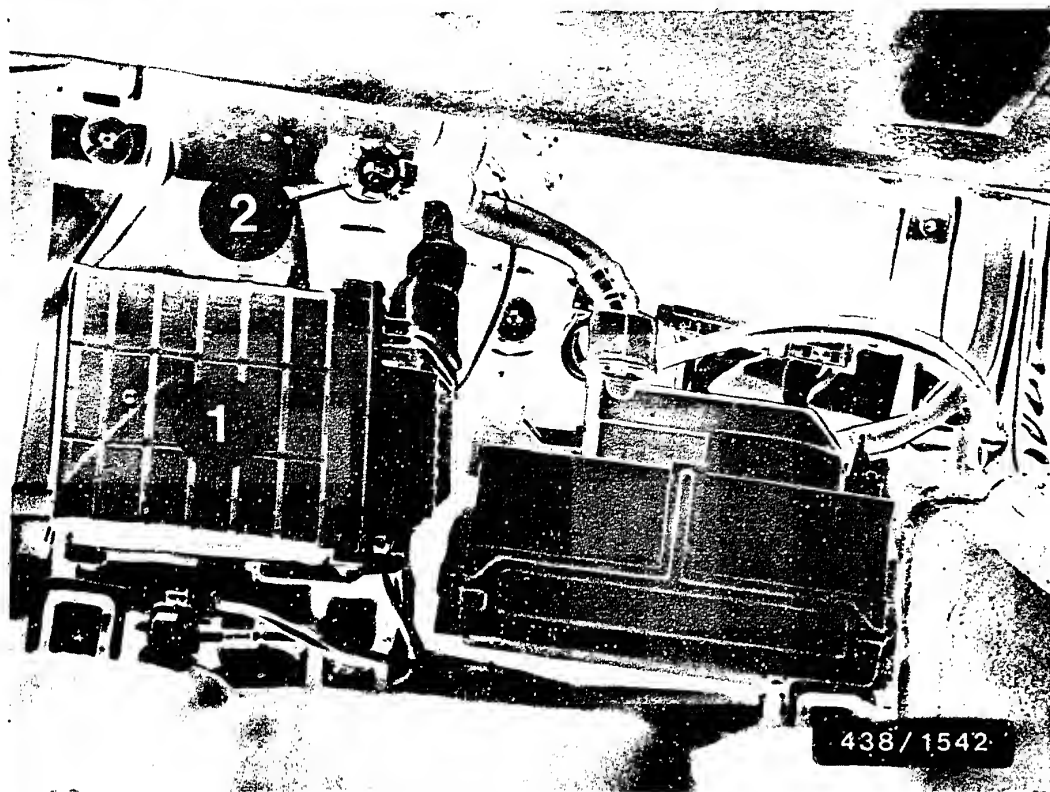
Electrical terminal diagram with electric fuel pump safety circuit (continued)



1 = Mixture-control unit
2 = Pressure regulator
3 = Injection valve

4 = Idle actuator (non-Bosch product)
5 = Cold-start valve

INSTALLATION POSITION OF COMPONENTS



- 1 = KE-Jetronic control unit (Type 107)
2 = Mixture-map trimming plug

In the Type 107, the KE-Jetronic control unit and mixture-map trimming plug are positioned in the footwell on the right beneath the floor panel;
in the Type 126, in the footwell on the right behind the side panel.

Installation position of further components

Relay, electric fuel pump:

In the Type 126, in the eng. comp, on left
in the Type 107, behind the glove comp.

Relay, over-voltage protection:

In the Type 126, in the eng. comp. on left
in the Type 107, in the footwell on right
behind the side panel.

Temperature sensor, engine (NTC II):

At the left (referring to forward
direction of travel) at cyl. head at rear.

TABLE OF CONTENTS

| | |
|-------------------------------|-------------------|
| Trouble-shooting instructions | : MB-5015 |
| BOSCH system | : KE 3.1-Jetronic |
| Vehicle make | : MERCEDES-BENZ |
| Basic microcard | : PKW-014 |

| Test instructions | Coordinates |
|---|-------------|
| Special features..... | L02 |
| Self-diagnosis/Rapid diagnosis chart..... | L07 - L18 |
| Test specifications..... | L03 - L06 |
| Electrical terminal diagram..... | L19 - L22 |
| Electrical wiring diagram..... | |
| Hydraulic-lines diagram..... | |
| Diagram of air/fuel lines..... | |
| Tools and test equipment..... | |
| Testing and adjustment instructions..... | |
| Installation position of components..... | L23 - L26 |
| Notes on removal and installation..... | |
| General important information..... | |

Tests without coordinate details are not applicable in these trouble-shooting instructions.

SPECIAL FEATURES

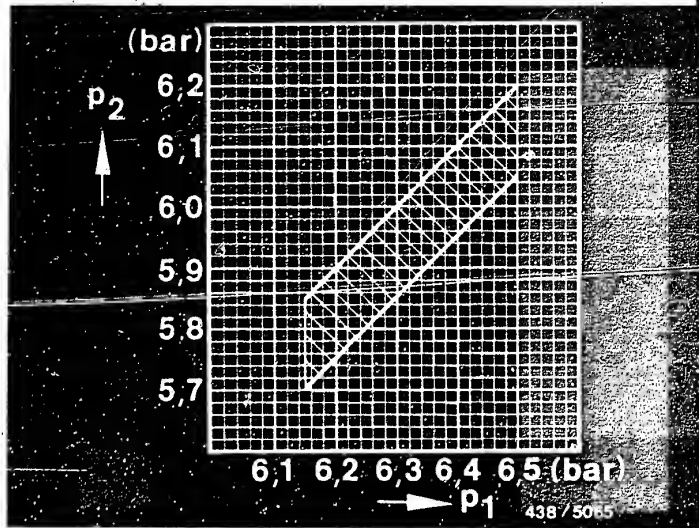
These instructions contain the KE 3.1-Jetronic trouble-shooting instructions, valid at the time of publication, for the following Mercedes-Benz models:

MERCEDES-BENZ
500 SE/SEL/SEC, 5,0l/8 Zyl. 09.85->

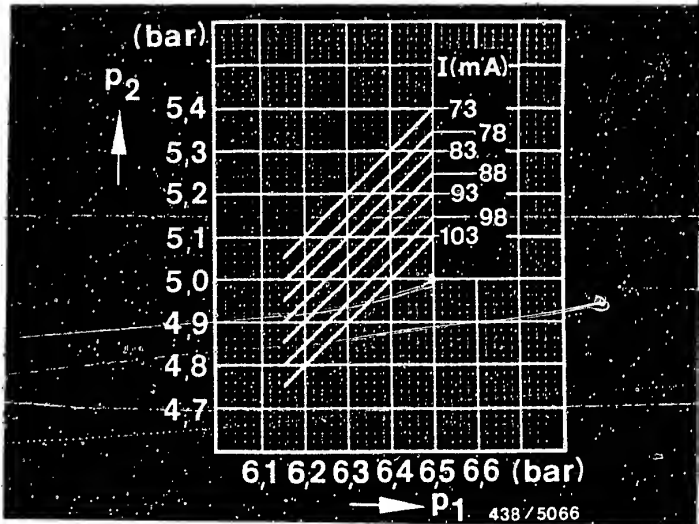
- Trouble-shooting with these instructions may only then take place when the details of the "Summary - Service Information for Vehicles" (KFZ-000) coincide with those of the vehicle type and with the BOSCH number of the KE-Jetronic control unit installed.
- Control unit using digital techniques, characteristic-map control using microprocessor.
- Multi-functional fuel-management system with a characteristic map for operation with lambda closed-loop control (CAT) and a characteristic map for operation without lambda closed-loop control (ECE). Activation of the characteristic maps by trimming plug with corresponding marking. To set to the fuel grades unleaded regular and unleaded premium, only the ignition trimming plug must be reconnected.
- Electronically controlled idle-speed control with single-winding rotary actuator, without bypass adjusting screw.
- Activated-carbon filter and regeneration valve for return of gasoline vapors into the intake manifold. (Fuel evaporation system)
- Secondary air injection (in CAT version only)

TEST SPECIFICATIONS

| No. | Testing/Test condition | Test specification | |
|-----|--|--|--|
| 1 | Electric fuel pump – fuel delivery: | At least 1800 cm ³ /min | |
| 2 | Primary pressure: | 6,15...6,5 bar | |
| 3 | Differential pressure: Suppression of peak coil current: Actuate starting motor with fuel-pump relay disconnected. <u>Do not</u> switch off ignition after starting. Take lower-chamber pressure set value "warm" from top chart corresponding to primary pressure measured. (Actuator current 0 mA) Take lower-chamber pressure set value "cold" from bottom chart corresponding to primary pressure measured and actuator current. Tolerance ± 0.15 bar. Simulation of "cold" state: press push-button 3 at test adapter. | | |
| 4 | Leakage test, complete system: Minimum pressure after 10 mins: Minimum pressure after 20 mins: | 3,3 bar 3,2 bar | |
| 5 | Injection valves, opening pressure: | 3,7...4,8 bar | |
| 6 | Fuel deliveries, comparative measurement: (Actuator current 0 mA) Idle: Part load: Full load: Min. delivery at max. air-flow sensor plate defl.: | Setting point: (cm ³ /min) 6,0 40,0 100,0 | Max. permis. delivery: (cm ³ /min) 6,8 42,5 109,0 |
| | | 140 cm ³ /min | |



p 1 = Primary pressure
p 2 = Lower-chamber pressure



TEST SPECIFICATIONS (CONTINUED)

| No. | Testing/Test condition | Test specification |
|-----|---|--|
| 7 | Rate of flow, KE restriction: | 130...150 cm ³ /min |
| 8 | Temperature sensor, air (NTC I): Air temperature +15...+30°C: | 1,3...3,6 k Ω |
| 9 | Temperature sensor, engine (NTC II): Engine cold (+15...+30°C): Engine warm (approx. +80°C): | 1,3...3,6 k Ω 250...390 Ω |
| 10 | Idle-mixture-adjusting screw basic setting: Fuel-distributor seat - needle bearing: | 22,6...22,8 mm |
| 11 | <p>Idle adjustment:</p> <p>Low-idle-speed control (non-Bosch product). For testing, engine at norm. op. temperature.</p> <p>Idle speed: Idle-actuator current at idle speed: Engage driving position, speed:</p> <p><u>Only ECE</u>: CO concentration in exhaust gas:</p> <p><u>Only CAT</u>: Check lambda closed-loop control: Measurement with lambda closed-loop control tester (e.g. KDJE-P 600) and adapter lead (e.g. KDJE-P 600/52) at diagnosis socket outlet (pin 3).</p> <p>Alternatively: Current measurement using the universal test adapter. Put fuel evaporation system out of operation.</p> <p>Determine on/off ratio (mean value) at n = 2500 min⁻¹.</p> <p>Deviation of on/off ratio (mean value) at idle compared to n = 2500 min⁻¹:</p> <p>Adjustment at idle-mixture-adjusting screw. After adjustment, repeat measurement.</p> | <p>600...700 min⁻¹ 700...1000 mA 450...550 min⁻¹</p> <p>1...2 % CO by vol.</p> <p>+5...+15 %</p> |

SELF-DIAGNOSIS

All Daimler-Benz 8-cylinder engines have been equipped as of FD 552 with self-diagnosis using on-off ratio measurement.

Defective input signals of the KE-Jetronic control unit may be indicated at the lambda test output (diagnosis socket outlet, socket 3) using the lambda closed-loop control tester.

Short circuiting and breaks in lines are detected. Sporadically occurring faults (e.g. loose contact) are not detected. Output of the fault signals takes priority over output of the lambda closed-loop control signal.

The faults which can be indicated are not discussed in detail here, since the input signals of the KE-Jetronic control unit may be tested using the universal test adapter (rapid diagnosis chart).

However, should a constant on-off ratio be indicated when testing the lambda closed-loop control using on-off ratio measurement, the input signals of the KE-Jetronic control unit must be checked (rapid diagnosis chart).

RAPID DIAGNOSIS CHART TO UNIVERSAL TEST ADAPTER ETT 018.01 WITH KE3 ADAPTER LEAD 1 684 463 169 AND APPROPRIATE MULTITESTER:

The following rapid diagnosis chart makes it possible for the experienced Jetronic expert to quickly check the electric/electronic peripheral and control-unit functions of the KE-Jetronic, including the lambda closed-loop control.

Important note on the rapid diagnosis chart:

The "Test conditions" column gives information as to in which test steps the control-unit plug must be connected/disconnected. Make absolutely certain that there is no current at the system when connecting or disconnecting, i.e. the ignition must be switched off and the electric safety circuit must not be short circuited.

The "Test connections" column provides information about the leads connected to the respective measuring path, referring to the assignment in the control-unit plug. Possibly necessary trouble-shooting is with regard to these leads.

The "Test specifications" column contains the test specifications for both the version without lambda closed-loop control (ECE, left-hand test-specifications column) and for the version with lambda closed-loop control (CAT, right-hand test-specifications column). Before starting testing, determine which version is being tested. If only one test specification is given, this applies to both versions.

Attention: When carrying out the test, make sure that the trimming plug is in position 1.

| No. | Switch/Btn V | Ω | Bt n | Under test | Test pins | Test conditions | Test specifications |
|-----|-----------------|----------|---------|---|--------------|--|---|
| 1 | V | 4 | - | Int. resistance(R_{\perp}) pressure actuator | 12-10 | Disconnect control-unit lead plug. | 20...30 Ω |
| 2 | V | 5 | - | Resistor NTC II (engine) | 21- 2 | Engine temperature +15°...+30° C; approx. +80° C: | 1,3...3,6k Ω 250...390 Ω |
| 3 | V | 6 | - | Resistor NTC I (intake air) | 11- 2 | Air temperature in area of NTC I: +15°...+30° C: | 1,3...3,6k Ω |
| 4 | | | | Signal, altitude sensor | | Connect control unit. Switch on ignition. Voltmeter connection to blue Ω sockets. Signal altitude-dependent: 0 meters (sea level): 500 meters: 1000 meters: 1500 meters: 2000 meters: 3000 meters: | Test step not applicable! |
| 5 | V | 9 | - | Throttle-valve switch, idle | 13- 2 | Switch off ignition. Disconnect control-unit lead plug. Throttle valve closed: open: | 0...10 Ω > 1000 Ω |
| 6 | V | 10 | - | Throttle-valve switch, full load | 5- 2 | Throttle valve closed: fully open: | > 5000 Ω 0...10 Ω |
| 7 | V | 11 | - | Microswitch idle linkage | 24- 2 | Throttle valve closed: open: | — Ω infinite Ω |
| 8 | V | 12 | - | Ground, control unit | 20- 2 | | 0...10 Ω |
| 9 | V | 13 | - | Ground, pin 7 | 7- 2 | Switch off ignition. Connect control unit. | 0...10 Ω |

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

| No. | Switch/Btn | | | Under test | Test pins | Test conditions | Test specifications | |
|-----|------------|----------|------|---|-----------|---|---|---|
| | V | Ω | Bt n | | | | ECE | CAT |
| 10 | V | 14 | - | Trimming plug mixture map | 22- 2 | Disconnect control-unit plug. Disconnect lead plug from air-flow sensor potentiometer and connect socket 1 of plug (in upper installation position) to engine ground. Trimming-plug position 1: 2: 3: 4: 5: 6: 7: | 50... 60 Ω 100...120 Ω 150...190 Ω 230...270 Ω 330...370 Ω 430...470 Ω 570...620 Ω | 900... 1020 Ω 1200... 1350 Ω 1500... 1350 Ω 2000... 2400 Ω 3000... 3600 Ω 5000... 5600 Ω 11000...12000 Ω |
| 11 | V | 15 | - | Transmission switch (automatic transmission only) | 16- 2 | Connect air-flow sensor potentiometer. Selection lever position P,N: Driving position selected: | 0...10 Ω > 3000 Ω | |
| 12 | 5 | - | - | TD signal | 25- 2 | Start engine (starting motor): | Voltage undefined | |
| 13 | 6 | - | - | Control-unit supply. | 1- 2 | Switch on ignition: | 8...15 V | |
| 14 | 10 | - | - | Supply, air-flow sensor potentiometer | 18- 2 | Switch off ignition. Connect control unit. Switch on ignition: | 4.35...5.35 V | |
| 15 | 11 | - | - | Signal, air-flow sensor potentiometer | 17- 2 | Switch on ignition. Air-flow sensor plate in neutral pos.: Deflect air-flow sensor plate by hand, continuous voltage rise up to max.: | approx. 0 V 5.35 V | |
| 16 | 13 | - | 1 | Temperature signal from control unit | 9- 2 | Switch on ignition. While actuating btn 1: | 1.5...1.9 V | |
| 17 | 14 | - | - | Consumption signal | 4- 2 | Start engine - idle: With regulation: | Voltage undefined Voltage change | |

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

| No. | Switch/Btn | | | Under test | Test pins | Test conditions | Test specifications | |
|-----|------------|----------|---------|---|-----------|--|--|--|
| | V | Ω | Bt n | | | | ECE | CAT |
| 18 | - | - | - | Peak coil current | 12-12 | Switch on ignition: | ->FD _____ : _____ mA FD 546->: 60...80 mA | ->FD _____ : _____ mA FD 546->: 65...85 mA |
| 19 | - | 21 | 2 | Actuator current Engine at normal operating temp. | 12-12 | Engine at normal operating temp, idle. Current value with btn 2 pressed: | ->FD _____ : _____ mA FD 546->: 2...4 mA | ->FD _____ : _____ mA FD 546->: -1...+1 mA |
| 20 | - | 21 | 2 | Starting enrich- ment | 12-12 | So that engine fails to start: disconnect speed relay for electric fuel pump. Short circuit ignition coil term.4 to ground via resistance of at least 2k Ω . (E.g. with sleeve-type suppressor and spark gap). While btn 1 pressed, actuate starting motor. Current rise (max. 1 sec.)to: | ->FD _____ : _____ mA FD 546->: 80...110 mA | ->FD _____ : _____ mA FD 546->: 80...110 mA |

FD = Date of manufacture

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

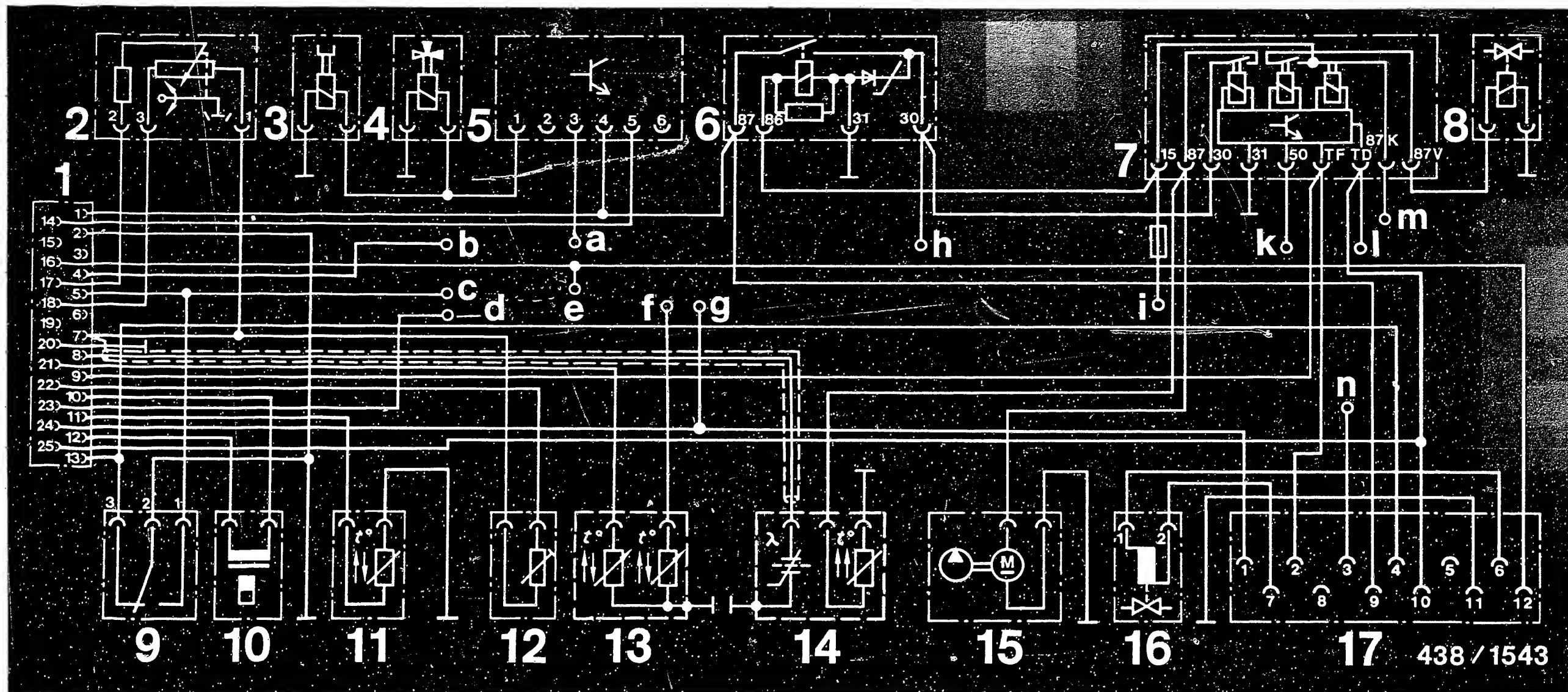
| No. | Switch/Btn V | Ω | Bt n | Under test | Test pins | Test conditions | Test specifications | |
|-----|-----------------|----------|---------|-------------------------|--------------|--|---|---|
| | | | | | | | ECE | CAT |
| 21 | - | 21 | 1 | Acceleration enrichment | 12-12 | Engine at norm. op. temp., idle. While actuating btn 1, perform snap acceleration of engine. Thus current rise (approx. 1 s.) to: <u>Note:</u> Level of current value dependent upon intensity of acceleration (travel/duration of air-flow sensor plate movement). | ->FD _____ : _____ mA FD 546->: 20...60 mA | ->FD _____ : _____ mA FD 546->: 20...50 mA |
| 22 | - | - | - | Overrun cut-off | 12-12 | Re-connect ohmmeter (positive and negative). Drive vehicle on chassis dynamometer or road. Speed > 40 km/h. Eng. speed n > 2500 min ⁻¹ . Vehicle in overrun (idle throttle-valve switch closed). Current reading: | -40...-80 mA | -40...-80 mA |

FD = Date of manufacture

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

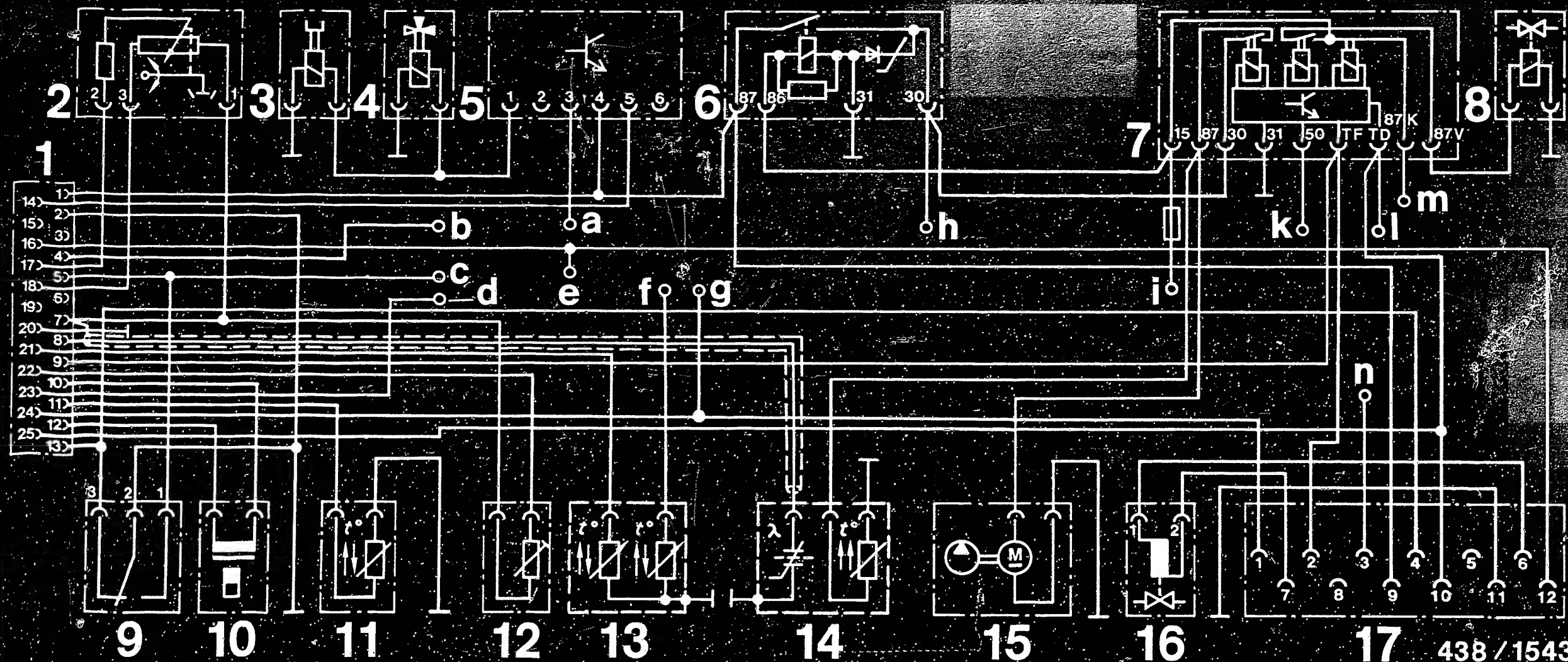
| No. | Switch/btn | | | Under test | Test pins | Test conditions | Test specifications | |
|-----|------------|----------|------|---|-----------|---|--|--|
| | V | Ω | Bt n | | | | ECE | CAT |
| 23 | — | 21 | — | Full-load enrichment | 12-12 | <p>Engine at normal operating temp., idle. Current value:</p> <p>Briefly push accelerator pedal to floor (full-load throttle-valve switch must switch). During speed rise, current value rises by:</p> <p><u>Attention:</u> Do this very briefly, so that speed does not rise too much and engine is not damaged.</p> | <p>->FD — : — mA FD 546->: 2...4 mA</p> <p>->FD — : — mA FD 546->: 3... 6 mA</p> | <p>->FD — : — mA FD 546->: -1...+1 mA</p> <p>->FD — : — mA FD 546->: 3... 6 mA</p> |
| 24 | — | 24 | — | Lambda closed-loop control, closed-loop control operation | 12-12 | <p>Disconnect regeneration lead to throttle-valve assembly from regeneration valve and seal off.</p> <p>Engine at norm. op. temp., idle. Closed-loop control operation can be recognized from the oscillating current reading. Mean value:</p> <p>If mean value outside tolerance, set (idle-mixture-adjusting screw) to:</p> | <p>—</p> <p>—</p> | <p>-2...+2 mA</p> <p>approx. 0 mA</p> |
| 25 | — | 22 | — | Lambda closed-loop control, rich stop | 12-12 | Engine at norm. op. temp., idle. Current rise to: | — | 10...14 mA |
| 26 | — | 23 | — | Lambda closed-loop control, lean stop | 12-12 | Engine at norm. op. temp., idle. Current drop to: | — | -8...-12 mA |

FD = Date of manufacture



- | | |
|--|---|
| 1 = Control unit, KE-Jetronic | 10 = Electro-hydraulic pressure actuator |
| 2 = Air-flow sensor potentiometer | 11 = Temperature sensor, intake air |
| 3 = Electro-magnetic coupling, air pump (CAT only) | 12 = Trimming plug, mixture map |
| 4 = Change-over valve, air pump (CAT only) | 13 = Temperature sensor, engine (double NTC) |
| 5 = Relay, air injection (CAT only) | 14 = Heated lambda sensor |
| 6 = Overvoltage-protection relay | 15 = Electric fuel pump |
| 7 = Electronic relay | (2 pumps are installed connected in parallel) |
| 8 = Cold-start valve | 16 = Idle actuator (non-Bosch product) |
| 9 = Throttle-valve switch, idle/full load | 17 = Control unit, low-idle-speed control |
| | (non-Bosch product) |

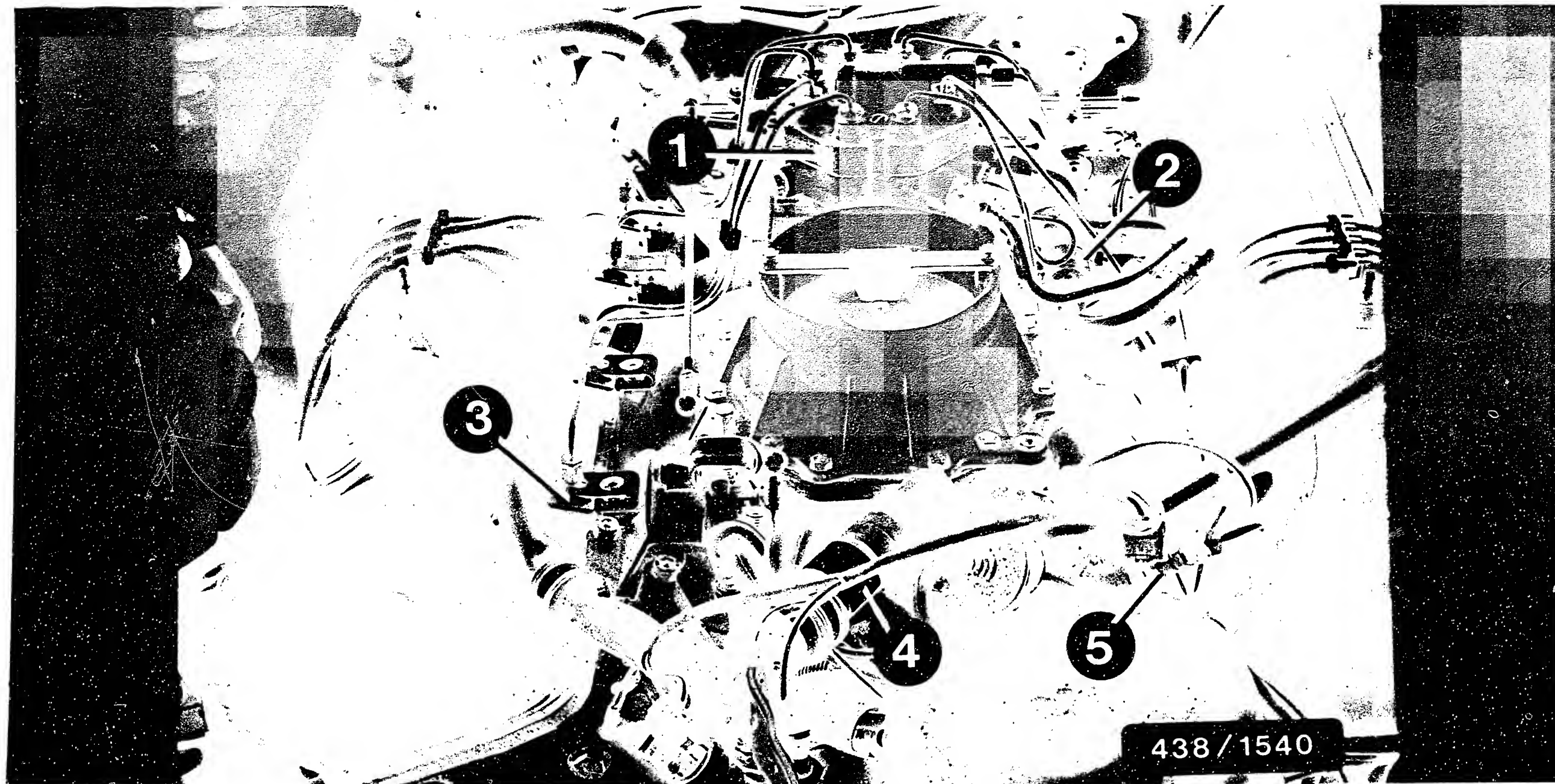
ELECTRICAL TERMINAL DIAGRAM WITH ELECTRIC FUEL PUMP SAFETY CIRCUIT



a = Terminal 15
 b = Plug connection, trip computer
 c = Trigger box, ignition system
 d = Lambda test output (diagnosis socket outlet, socket 3)
 e = Plug connection, start-locking switch, socket 3
 f = Trigger box, ignition system
 g = Speed signal

h = Terminal 30
 i = Terminal 15 (fuse 7)
 k = Plug connection, start-locking switch, socket 4
 l = Terminal TD, ignition
 m = Kick-down switch, socket 1
 n = Control unit, compressor cutoff

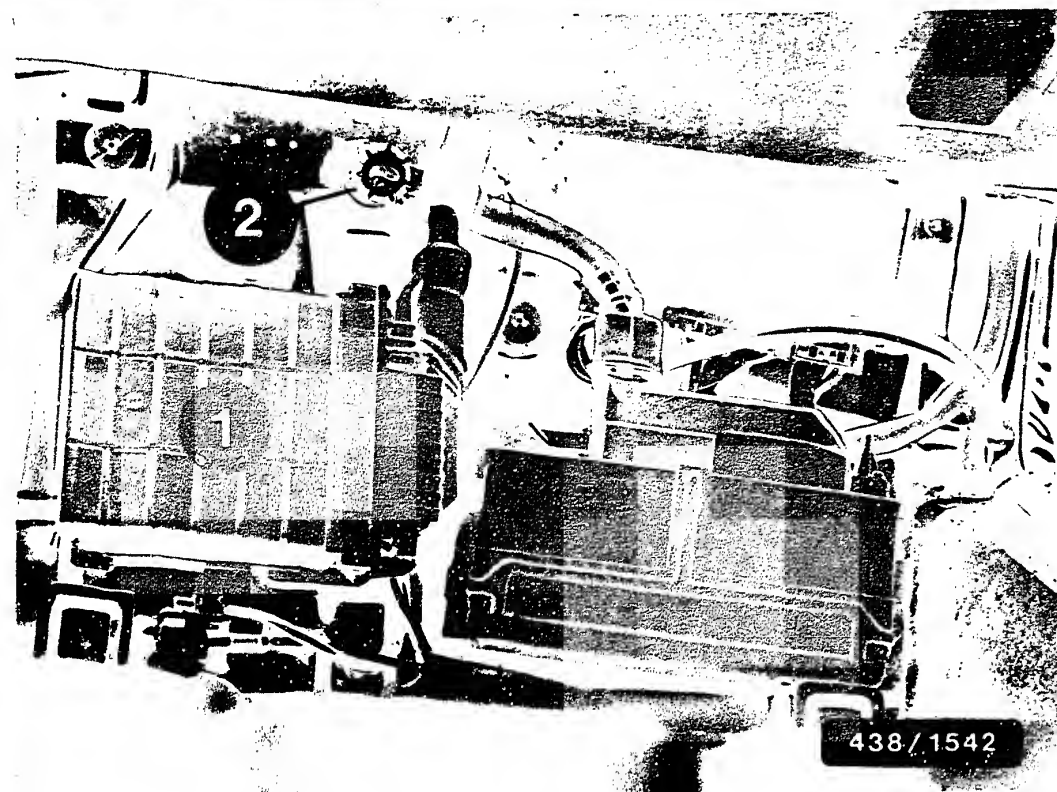
Electrical terminal diagram with electric fuel pump safety circuit (continued)



1 = Mixture-control unit
2 = Pressure regulator
3 = Injection valve

4 = Idle actuator (non-Bosch product)
5 = Cold-start valve

INSTALLATION POSITION OF COMPONENTS



- 1 = KE-Jetronic control unit (Type 107)
 2 = Mixture-map trimming plug

In the Type 107, the KE-Jetronic control unit and mixture-map trimming plug are positioned in the footwell on the right beneath the floor panel;
 in the Type 126, in the footwell on the right behind the side panel.

Installation position of further components

Relay, electric fuel pump:

In the Type 126, in the eng. comp, on left
 in the Type 107, behind the glove comp.

Relay, over-voltage protection:

In the Type 126, in the eng. comp. on left
 in the Type 107, in the footwell on right
 behind the side panel.

Temperature sensor, engine (NTC II):

At the left (referring to forward
 direction of travel) at cyl. head at rear.

TABLE OF CONTENTS

Trouble-shooting instructions : MB-5016

BOSCH system : KE 3.1-Jetronic

Vehicle make : MERCEDES-BENZ

Basic microcard : PKW-014

| Test instructions | Coordinates |
|---|-------------|
| Special features..... | M02 |
| Self-diagnosis/Rapid diagnosis chart..... | M07 - M18 |
| Test specifications..... | M03 - M06 |
| Electrical terminal diagram..... | M19 - M22 |
| Electrical wiring diagram..... | |
| Hydraulic-lines diagram..... | |
| Diagram of air/fuel lines..... | |
| Tools and test equipment..... | |
| Testing and adjustment instructions..... | |
| Installation position of components..... | M23 - M25 |
| Notes on removal and installation..... | |
| General important information..... | |

Tests without coordinate details are not applicable in these trouble-shooting instructions.

SPECIAL FEATURES

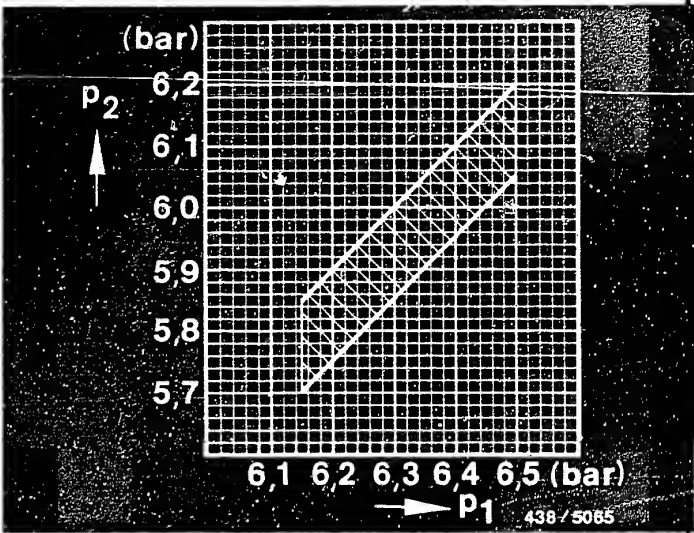
These instructions contain the KE 3.1-Jetronic trouble-shooting instructions, valid at the time of publication, for the following Mercedes-Benz models:

MERCEDES-BENZ
560 SEL/SEC, 5,6l/8Zyl. 10.85->

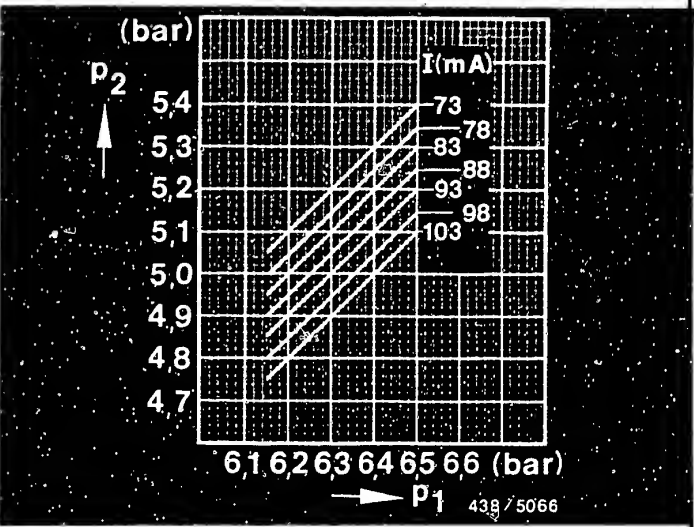
- Trouble-shooting with these instructions may only then take place when the details of the "Summary - Service Information for Vehicles" (KFZ-000) coincide with those of the vehicle type and with the BOSCH number of the KE-Jetronic control unit installed.
- Control unit using digital techniques, characteristic-map control using microprocessor.
- Multi-functional fuel-management system with a characteristic map for operation with lambda closed-loop control (CAT) and a characteristic map for operation without lambda closed-loop control (ECE). Activation of the characteristic maps by trimming plug with corresponding marking. To set to the fuel grades unleaded regular and unleaded premium, only the ignition trimming plug must be reconnected.
- Electronically controlled idle-speed control with single-winding rotary actuator, without bypass adjusting screw.
- Activated-carbon filter and regeneration valve for return of gasoline vapors into the intake manifold. (Fuel evaporation system)
- Secondary air injection (in CAT version only)

TEST SPECIFICATIONS

| No. | Testing/Test condition | Test specification | |
|-----|--|--|--|
| 1 | Electric fuel pump – fuel delivery: | At least > 1950 cm ³ /min | |
| 2 | Primary pressure: | 6,15...6,5 bar | |
| 3 | Differential pressure: Suppression of peak coil current: Actuate starting motor with fuel-pump relay disconnected. <u>Do not</u> switch off ignition after starting. Take lower-chamber pressure set value "warm" from top chart corresponding to primary pressure measured. (Actuator current 0 mA) Take lower-chamber pressure set value "cold" from bottom chart corresponding to primary pressure measured and actuator current. Tolerance ± 0.15 bar. Simulation of "cold" state: press push-button 3 at test adapter. | | |
| 4 | Leakage test, complete system: Minimum pressure after 10 mins: Minimum pressure after 20 mins: | 3,3 bar 3,2 bar | |
| 5 | Injection valves, opening pressure: | 3,7...4,8 bar | |
| 6 | Fuel deliveries, comparative measurement: (Actuator current 0 mA) Idle: Part load: Full load: Min. delivery at max. air-flow sensor plate defl.: | Setting point: (cm ³ /min) 6,0 40,0 100,0 | Max. permis. delivery: (cm ³ /min) 6,8 42,5 109,0 |
| | | 140 cm ³ /min | |



p 1 = Primary pressure
p 2 = Lower-chamber pressure



TEST SPECIFICATIONS (CONTINUED)

| No. | Testing/Test condition | Test specification |
|-----|---|--|
| 7 | Rate of flow, KE restriction: | 130...150 cm ³ /min |
| 8 | Temperature sensor, air (NTC I): Air temperature +15...+30°C: | 1,3...3,6 k Ω |
| 9 | Temperature sensor, engine (NTC II): Engine cold (+15...+30°C): Engine warm (approx. +80°C): | 1,3...3,6 k Ω 250...390 Ω |
| 10 | Idle-mixture-adjusting screw basic setting: Fuel-distributor seat - needle bearing: | 22,6...22,8 mm |
| 11 | <p>Idle adjustment:</p> <p>Low-idle-speed control (non-Bosch product). For testing, engine at norm. op. temperature.</p> <p>Idle speed: Idle-actuator current at idle speed: Engage driving position, speed:</p> <p><u>Only ECE:</u> CO concentration in exhaust gas:</p> <p><u>Only CAT:</u> Check lambda closed-loop control: Measurement with lambda closed-loop control tester (e.g. KDJE-P 600) and adapter lead (e.g. KDJE-P 600/52) at diagnosis socket outlet (pin 3).</p> <p>Alternatively: Current measurement using the universal test adapter. Put fuel evaporation system out of operation.</p> <p>Determine on/off ratio (mean value) at $n = 2500 \text{ min}^{-1}$.</p> <p>Deviation of on/off ratio (mean value) at idle compared to $n = 2500 \text{ min}^{-1}$:</p> <p>Adjustment at idle-mixture-adjusting screw. After adjustment, repeat measurement.</p> | <p>600...700 min⁻¹ 700...1000 mA 500...600 min⁻¹</p> <p>1...2 % CO by vol.</p> <p>+5...+15 %</p> |

SELF-DIAGNOSIS

All Daimler-Benz 8-cylinder engines have been equipped as of FD 552 with self-diagnosis using on-off ratio measurement.

Defective input signals of the KE-Jetronic control unit may be indicated at the lambda test output (diagnosis socket outlet, socket 3) using the lambda closed-loop control tester.

Short circuiting and breaks in lines are detected. Sporadically occurring faults (e.g. loose contact) are not detected. Output of the fault signals takes priority over output of the lambda closed-loop control signal.

The faults which can be indicated are not discussed in detail here, since the input signals of the KE-Jetronic control unit may be tested using the universal test adapter (rapid diagnosis chart).

However, should a constant on-off ratio be indicated when testing the lambda closed-loop control using on-off ratio measurement, the input signals of the KE-Jetronic control unit must be checked (rapid diagnosis chart).

RAPID DIAGNOSIS CHART TO UNIVERSAL TEST ADAPTER ETT 018.01 WITH KE3 ADAPTER LEAD 1 684 463 169 AND APPROPRIATE MULTITESTER:

The following rapid diagnosis chart makes it possible for the experienced Jetronic expert to quickly check the electric/electronic peripheral and control-unit functions of the KE-Jetronic, including the lambda closed-loop control.

Important note on the rapid diagnosis chart:

The "Test conditions" column gives information as to in which test steps the control-unit plug must be connected/disconnected. Make absolutely certain that there is no current at the system when connecting or disconnecting, i.e. the ignition must be switched off and the electric safety circuit must not be short circuited.

The "Test connections" column provides information about the leads connected to the respective measuring path, referring to the assignment in the control-unit plug. Possibly necessary trouble-shooting is with regard to these leads.

The "Test specifications" column contains the test specifications for both the version without lambda closed-loop control (ECE, left-hand test-specifications column) and for the version with lambda closed-loop control (CAT, right-hand test-specifications column). Before starting testing, determine which version is being tested. If only one test specification is given, this applies to both versions.

Attention: When carrying out the test, make sure that the trimming plug is in position 1.

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

| No. | Switch/Btn V | Ω | Bt n | Under test | Test pins | Test conditions | Test specifications |
|-----|-----------------|----------|---------|---|--------------|--|---|
| 1 | V | 4 | - | Int. resistance(R _i) pressure actuator | 12-10 | Disconnect control-unit lead plug. | 20...30 Ω |
| 2 | V | 5 | - | Resistor NTC II (engine) | 21- 2 | Engine temperature +15°...+30° C; approx. +80° C: | 1,3...3,6k Ω 250...390 Ω |
| 3 | V | 6 | - | Resistor NTC I (intake air) | 11- 2 | Air temperature in area of NTC I: +15°...+30° C: | 1,3...3,6k Ω |
| 4 | | | | Signal, altitude sensor | | Connect control unit. Switch on ignition. Voltmeter connection to blue Ω sockets. Signal altitude-dependent: 0 meters (sea level); 500 meters; 1000 meters; 1500 meters; 2000 meters; 3000 meters: | Test step not applicable! |
| 5 | V | 9 | - | Throttle-valve switch, idle | 13- 2 | Switch off ignition. Disconnect control-unit lead plug. Throttle valve closed: open: | 0...10 Ω > 1000 Ω |
| 6 | V | 10 | - | Throttle-valve switch, full load | 5- 2 | Throttle valve closed: fully open: | > 5000 Ω 0...10 Ω |
| 7 | V | 11 | - | Microswitch idle linkage | 24- 2 | Throttle valve closed: open: | — Ω infinite Ω |
| 8 | V | 12 | - | Ground, control unit | 20- 2 | | 0...10 Ω |
| 9 | V | 13 | - | Ground, pin 7 | 7- 2 | Switch off ignition. Connect control unit. | 0...10 Ω |

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

| No. | Switch/Btn | | | Under test | Test pins | Test conditions | Test specifications | |
|-----|------------|----------|------|---|-----------|---|-------------------------------------|---|
| | V | Ω | Bt n | | | | ECE | CAT |
| 10 | V | 14 | - | Trimming plug mixture map | 22- 2 | Disconnect control-unit plug. Disconnect lead plug from air-flow sensor potentiometer and connect socket 1 of plug (in upper installation position) to engine ground. Trimming-plug position 1: 50... 60 Ω 2: 100...120 Ω 3: 150...190 Ω 4: 230...270 Ω 5: 330...370 Ω 6: 430...470 Ω 7: 570...620 Ω | | 900... 1020 Ω 1200... 1350 Ω 1500... 1350 Ω 2000... 2400 Ω 3000... 3600 Ω 5000... 5600 Ω 11000...12000 Ω |
| 11 | V | 15 | - | Transmission switch (automatic transmission only) | 16- 2 | Connect air-flow sensor potentiometer. Selection lever position P,N: 0...10 Ω Driving position selected: > 3000 Ω | | |
| 12 | 5 | - | - | TD signal | 25- 2 | Start engine (starting motor): | Voltage undefined | |
| 13 | 6 | - | - | Control-unit supply. | 1- 2 | Switch on ignition: | 8...15 V | |
| 14 | 10 | - | - | Supply, air-flow sensor potentiometer | 18- 2 | Switch off ignition. Connect control unit. Switch on ignition: | 4.35...5.35 V | |
| 15 | 11 | - | - | Signal, air-flow sensor potentiometer | 17- 2 | Switch on ignition. Air-flow sensor plate in neutral pos.: Deflect air-flow sensor plate by hand, continuous voltage rise up to max.: | approx. 0 V 5.35 V | |
| 16 | 13 | - | 1 | Temperature signal from control unit | 9- 2 | Switch on ignition. While actuating btn 1: | 1.5...1.9 V | |
| 17 | 14 | - | - | Consumption signal | 4- 2 | Start engine - idle: With regulation: | Voltage undefined Voltage change | |

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

| No. | Switch/Btn | | | Under test | Test pins | Test conditions | Test specifications | |
|-----|------------|----------|------|--|-----------|--|--|--|
| | V | Ω | Bt n | | | | ECE | CAT |
| 18 | - | - | - | Peak coil current | 12-12 | Switch on ignition: | ->FD — : — mA FD 546->: 60...80 mA | ->FD — : — mA FD 546->: 65...85 mA |
| 19 | - | 21 | 2 | Actuator current Engine at normal operating temp. | 12-12 | Engine at normal operating temp, idle. Current value with btn 2 pressed: | ->FD — : — mA FD 546->: 2...4 mA | ->FD — : — mA FD 546->: -1...+1 mA |
| 20 | - | 21 | 2 | Starting enrichment | 12-12 | So that engine fails to start: disconnect speed relay for electric fuel pump. Short circuit ignition coil term.4 to ground via resistance of at least 2k Ω . (E.g. with sleeve-type suppressor and spark gap). While btn 1 pressed, actuate starting motor. Current rise (max. 1 sec.) to: | ->FD — : — mA FD 546->: 80...110 mA | ->FD — : — mA FD 546->: 80...110 mA |

FD = Date of manufacture

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

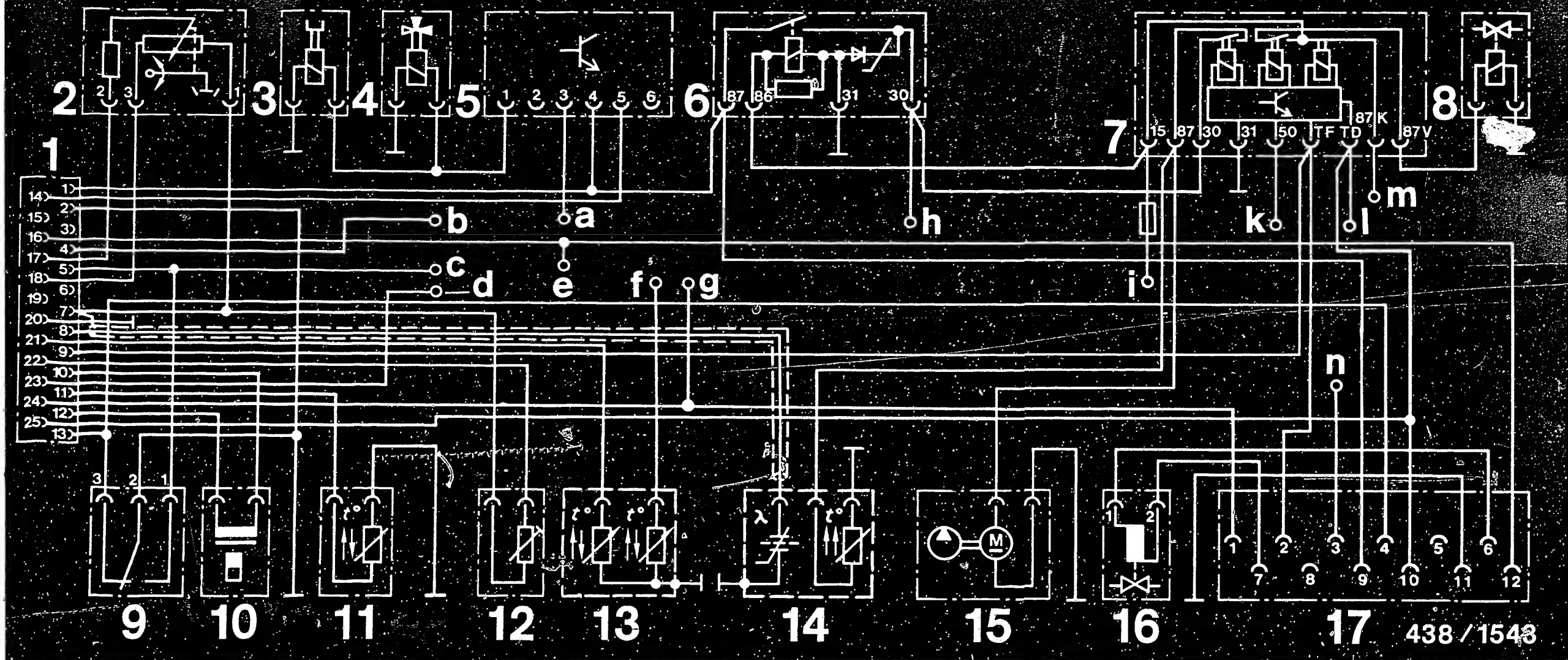
| No. | Switch/ V | Btn Ω | Bt n | Under test | Test pins | Test conditions | Test specifications | |
|-----|--------------|-----------------|---------|-------------------------|--------------|---|--|---|
| | | | | | | | ECE | CAT |
| 21 | - | 21 | 1 | Acceleration enrichment | 12-12 | <p>Engine at norm. op. temp., idle. While actuating btn 1, perform snap acceleration of engine. Thus current rise (approx. 1 s.) to:</p> <p><u>Note:</u> Level of current value dependent upon intensity of acceleration (travel/duration of air-flow sensor plate movement).</p> | <p>—</p> <p>→FD — : — mA FD 546→: 20...60 mA</p> | <p>→FD — : — mA FD 546→: 20...60 mA</p> |
| 22 | - | - | - | Overrun cut-off | 12-12 | <p>Re-connect ohmmeter (positive and negative). Drive vehicle on chassis dynamometer or road.</p> <p>Speed > 40 km/h. Eng. speed n > 2500 min⁻¹.</p> <p>Vehicle in overrun (idle throttle-valve switch closed). Current reading:</p> | <p>—</p> <p>—40...-80 mA</p> | <p>—</p> <p>-40...-80 mA</p> |

FD = Date of manufacture

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01 (CONTINUED)

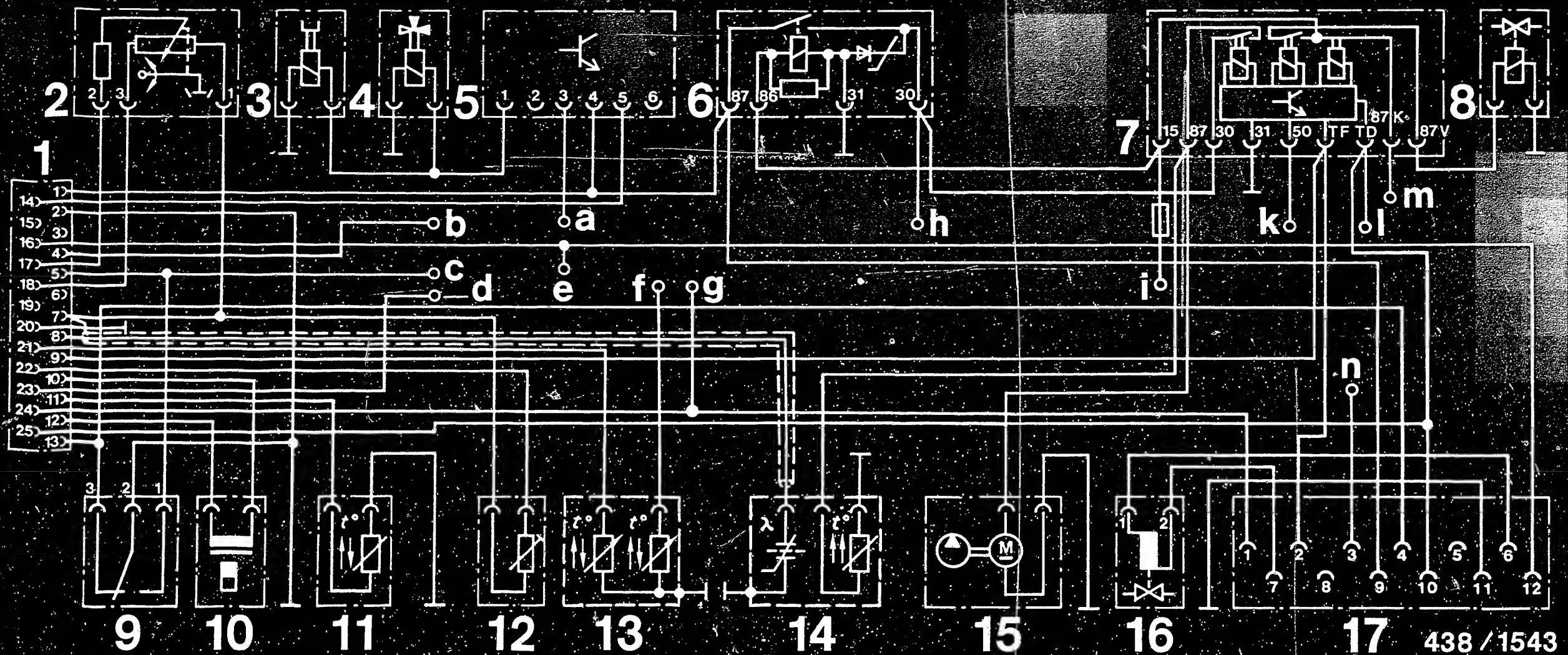
| No. | Switch/btn | | | Under test | Test pins | Test conditions | Test specifications | |
|-----|------------|----------|------|---|-----------|---|--|--|
| | V | Ω | Bt n | | | | ECE | CAT |
| 23 | — | 21 | — | Full-load enrichment | 12-12 | <p>Engine at normal operating temp., idle. Current value:</p> <p>Briefly push accelerator pedal to floor (full-load throttle-valve switch must switch). During speed rise, current value rises by:</p> <p><u>Attention:</u> Do this very briefly, so that speed does not rise too much and engine is not damaged.</p> | <p>->FD — : — mA FD 546->: 2...4 mA</p> <p>->FD — : — mA FD 546->: 3... 6 mA</p> | <p>->FD — : — mA FD 546->: -1...+1 mA</p> <p>->FD — : — mA FD 546->: 3... 6 mA</p> |
| 24 | — | 24 | — | Lambda closed-loop control, closed-loop control operation | 12-12 | <p>Disconnect regeneration lead to throttle-valve assembly from regeneration valve and seal off.</p> <p>Engine at norm. op. temp., idle. Closed-loop control operation can be recognized from the oscillating current reading. Mean value:</p> <p>If mean value outside tolerance, set (idle-mixture-adjusting screw) to:</p> | <p>—</p> <p>—</p> | <p>-2... +2 mA</p> <p>approx. 0 mA</p> |
| 25 | — | 22 | — | Lambda closed-loop control, rich stop | 12-12 | Engine at norm. op. temp., idle. Current rise to: | — | 10...14 mA |
| 26 | — | 23 | — | Lambda closed-loop control, lean stop | 12-12 | Engine at norm. op. temp., idle. Current drop to: | — | -8...-12 mA |

FD = Date of manufacture



- | | |
|--|---|
| 1 = Control unit, KE-Jetronic | 10 = Electro-hydraulic pressure actuator |
| 2 = Air-flow sensor potentiometer | 11 = Temperature sensor, intake air |
| 3 = Electro-magnetic coupling, air pump (CAT only) | 12 = Trimming plug, mixture map |
| 4 = Change-over valve, air pump (CAT only) | 13 = Temperature sensor, engine (double NTC) |
| 5 = Relay, air injection (CAT only) | 14 = Heated lambda sensor |
| 6 = Overvoltage-protection relay | 15 = Electric fuel pump |
| 7 = Electronic relay | (2 pumps are installed connected in parallel) |
| 8 = Cold-start valve | 16 = Idle actuator (non-Bosch product) |
| 9 = Throttle-valve switch, idle/full load | 17 = Control unit, low-idle-speed control |
| | (non-Bosch product). |

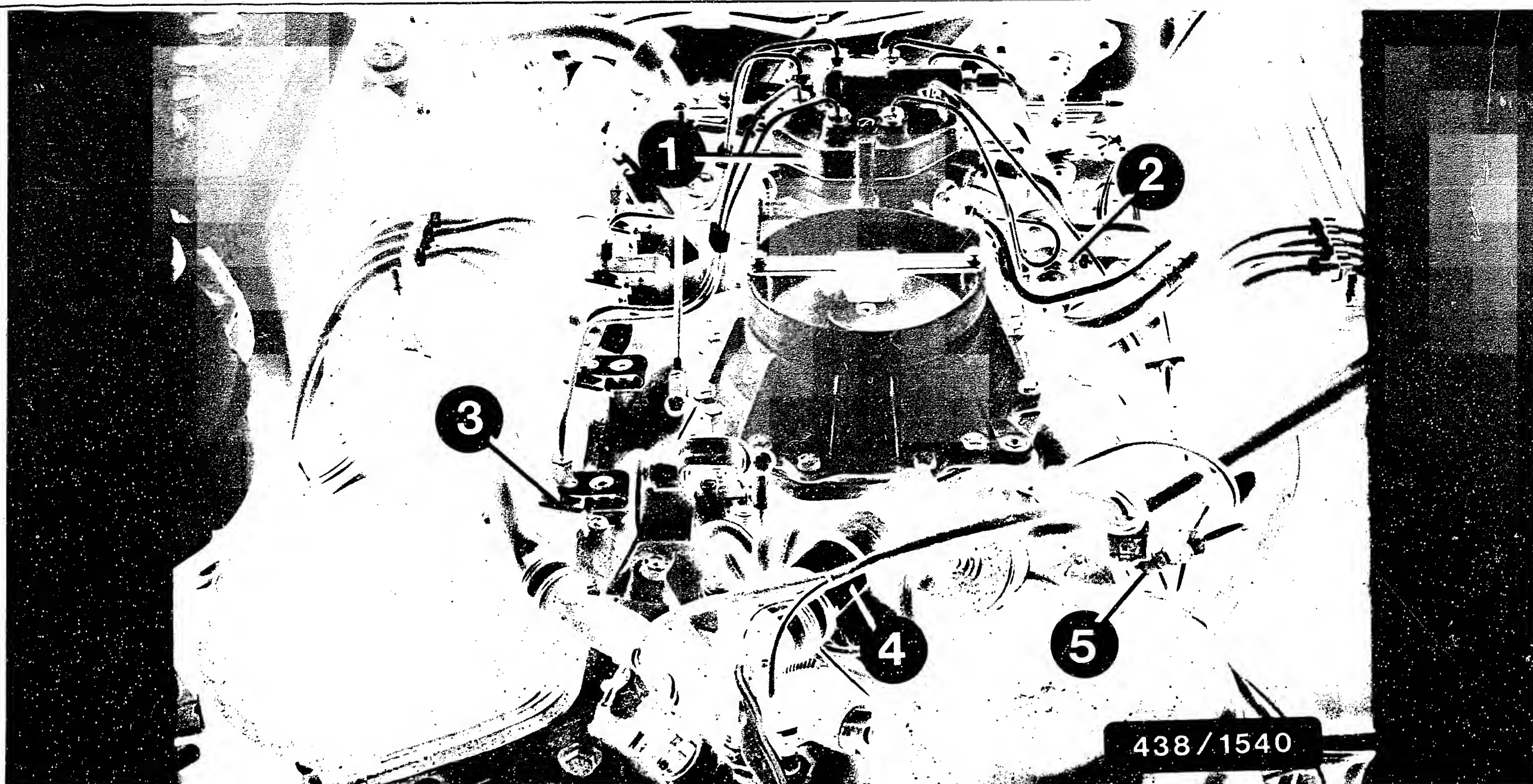
ELECTRICAL TERMINAL DIAGRAM WITH ELECTRIC FUEL PUMP SAFETY CIRCUIT



a = Terminal 15
 b = Plug connection, trip computer
 c = Trigger box, ignition system
 d = Lambda test output (diagnosis socket outlet, socket 3)
 e = Plug connection, start-locking switch, socket 3
 f = Trigger box, ignition system
 g = Speed signal

h = Terminal 30
 i = Terminal 15 (fuse 7)
 k = Plug connection, start-locking switch, socket 4
 l = Terminal TD, ignition
 m = Kick-down switch, socket 1
 n = Control unit, compressor cutoff

Electrical terminal diagram with electric fuel pump safety circuit (continued)



1 = Mixture-control unit
2 = Pressure regulator
3 = Injection valve

4 = Idle actuator (non-Bosch product)
5 = Cold-start valve

INSTALLATION POSITION OF COMPONENTS

INSTALLATION POSITION OF COMPONENTS
(CONTINUED)

- * KE-Jetronic control unit, mixture map
trimming plug:
In footwell on right behind side
panelling.
- * Relay, electric fuel pump:
In engine compartment on left.
- * Relay, over-voltage protection:
In engine compartment on left.
- * Temperature sensor, engine (NTC II):
On left, as seen from forward direction of
travel, at rear on cylinder head.

For production reasons:
continued on the following
coordinate.